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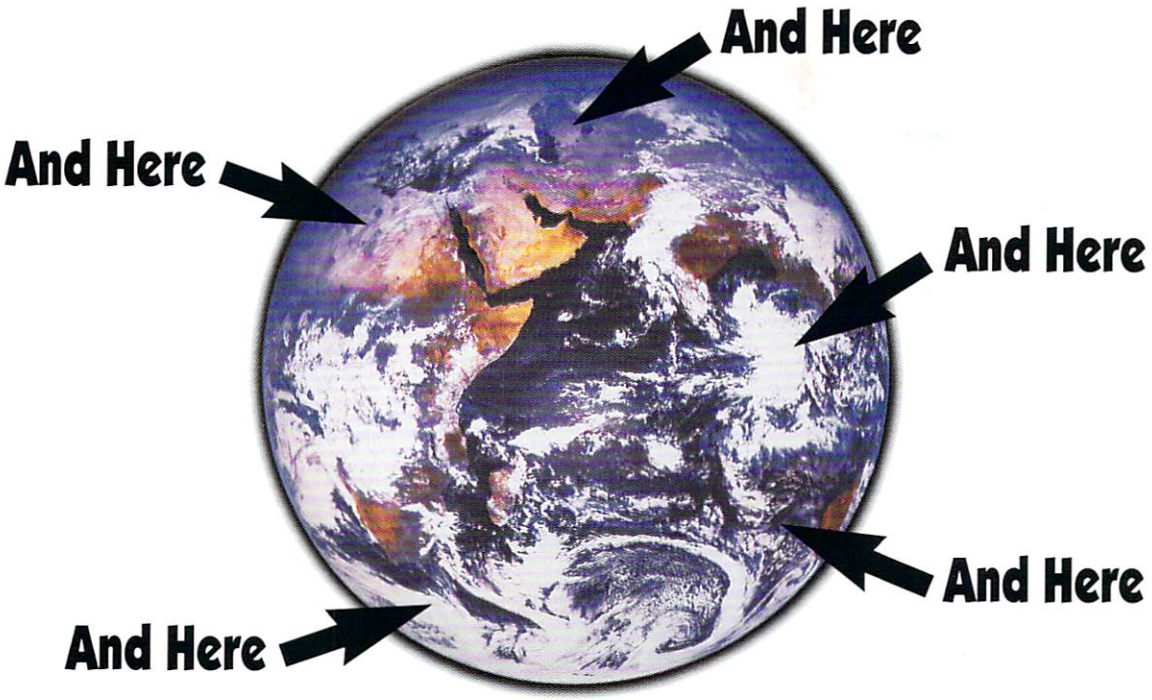

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64/128 VIEW

COMPUTE says goodbye to Amiga Resource, but Gazette will continue—with your help!

Tom Netsel

There's good news and bad news this month. Let's get the depressing item out of the way and then finish on a couple of upbeat notes.

The bad news is that this issue marks the final edition of Amiga Resource. As Gazette is available for 64 and 128 users, Amiga Resource was available to Amiga subscribers as a special section in COMPUTE. Subscribers to COMPUTE's multiedition received both the Amiga and Gazette sections.

What began in 1988 as a sporadic buyer's guide for Amiga products evolved into a quarterly publication in the spring of 1989. Reader response was enthusiastic, and Amiga Resource became a bimonthly publication less than a year later. In the summer of 1990, General Media bought COMPUTE Publications and relaunched the magazines in their present format. Amiga Resource went monthly with Denny Atkin as editor.

In a computer market dominated by IBM and clones, Amiga Resource and Gazette provided coverage for a dedicated core of Commodore users. As long as each section had a sufficient subscribers, publication could continue. Those numbers are no longer there for Amiga Resource.

That's the bad news. The good news is that Gazette continues. Thanks to your support, we still have enough subscribers to warrant the time, effort, and expense of turning out a 40-page section devoted to an 11-year-old computer. How long Gazette continues is up to you readers. If you renew your subscription and encourage fellow Commodore owners to subscribe, then we'll continue. If you feel it's time for Gazette to call it quits, let your subscription lapse.

Naturally, I hope you'll continue supporting Gazette as you've done for the past ten years. Commodore users from around the world continue to produce amazing programs for the magazine and its companion disk. And after more than a decade of publishing, our columnists and writers still haven't exhausted their editorial possibilities. I've got some great programs and articles that I want to share with you, and it'd be a shame to waste all this valuable information. I hope I can count on your continuing support.

Here's some more good news. Creative Micro Designs (CMD) is now handling a lot more Commodore software and hardware. It recently purchased all of the products that *RUN* magazine once offered through TechMedia.

CMD has confirmed that it is taking orders, and a new catalog of products that include the GEOS Companion disks, Productivity Pak, modems, and heavy-duty power supplies should be available by the time you read this.

CMD is searching for more Commodore products from other firms as well. The Massachusetts-based company wants to become an even greater resource for Commodore owners by offering a wider range of software and hard-to-find products. Keep up the good work, CMD! ❐

GAZETTE

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Printers are practically a requirement for any well-equipped computer system. Through the use of an interface, a 64 or 128 can connect to almost any printer, but the dot-matrix is still the choice of most Commodore users.

PRINTER POTPOURRI

When the 64 was introduced 11 years ago, its users were severely restricted in their selection of printers. One of the reasons for this was because their computer didn't come with an industry standard Centronics parallel or RS-232 serial port.

Printers from Commodore were the only game in town for some years, and they were generally high-priced and of poor quality. Most third-party printers came equipped with Centronics parallel ports (RS-232 ports were available as an option), but they were incompatible with Commodore hardware. Luckily for us users, a number of companies produced printer interfaces that enabled us to use these third-party printers with our Commodores.

These days, most any printer, be it dot-matrix, ink jet, or laser, can be connected to a Commodore through one of these printer interfaces. Although laser printers have experienced dramatic price reductions, most Commodore users still opt for dot-matrix printers, which offer excellent quality at affordable prices.

In the Mode

Getting back to the interface, these devices take the nonstandard Commodore serial port signal and make it look like a Centronics-compatible signal, which most third-party printers can recognize. Interfaces typically allow several modes of operation. One mode always is the downwardly compatible 1525-emulation mode. This mode uses Commodore graphic characters stored in the interface ROM and blocks all non-Commodore printer codes from reaching the printer. This means that a fancy printer is essentially downgraded into acting like a 1525. This mode is useful only with ancient programs that don't support any other printer.

Printer interfaces also allow you to use all the features of your printer through what is aptly named transparent mode. This means that the output from your program is sent unaltered to the printer. In this case, the interface simply takes the Commodore serial data bit by bit and sends the information as eight parallel data bits. It also sends along a few handshake signals, which the printer needs in order to communicate with your computer. More about these later.

Then There's PETSCII

Not only is the 64's hardware nonstandard, but the numerical codes that it uses to represent characters is also nonstandard. Practically all printers use what is known as the ASCII standard, where a code value of 65 stands for an uppercase letter *A*. The 64, however, interprets an ASCII value of 65 as a lowercase *a*.

For the benefit of the printer—and your printouts—the interface translates the Commodore codes (sometimes called PETSCII or CBMSCII) that flow from the computer into ASCII codes. Some 64 word processors generate ASCII output directly, and these work very well if you set the interface to its transparent mode. Even if your 64 program sends true ASCII code, you still need the interface in order to supply the correct electrical signals for the printer.

Interfaces also allow you to print program listings in several ways. The embedded graphic characters and control codes that represent color changes, cursor movements, or screen-clearing functions that you see when you list a program on your monitor can be made to appear in the printed listing as graphic characters, key combinations, or a numerical code.

Some interfaces also have a hex-dump mode in which the hexadecimal values of all the characters that are sent by the computer are printed. This comes in handy when you're debugging should a program hang up the printer by sending an unwanted control char-

BY RANJAN BOSE

acter. Since many printers can be set to work in this mode, you probably won't miss it if your interface lacks a hex mode.

Interfaces also allow you to turn linefeeds on or off as needed. This is another feature that's present on many of today's printers.

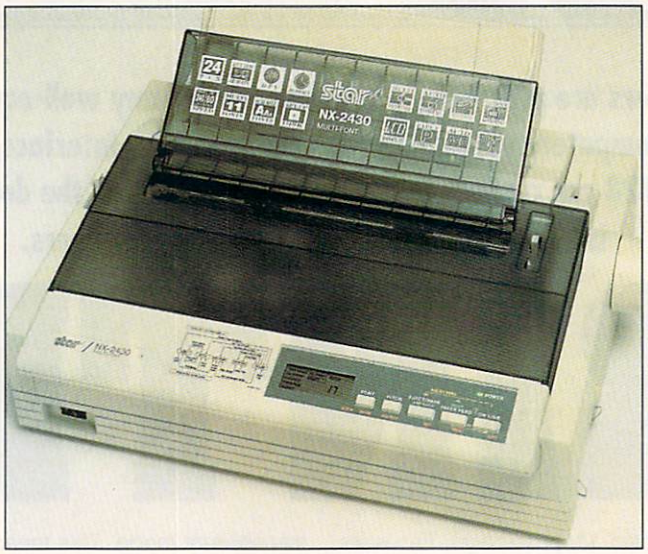
Most printer interfaces come with a buffer. This is memory that is resident outside the computer. It can be as tiny as 128 bytes or as large as 32K. Rather than waiting around for the printer to accept the printout information, the computer dumps it to the buffer. The computer is free to work on other chores, and the buffer hangs onto the information until the printer is ready to print it. The bigger the buffer, the sooner it frees the computer when you have a large file to print.

Making Contact

The printer and computer first establish a common time frame (handshake) by using a strobe signal, which is a volley of very fast and regularly occurring electric pulses. The computer then waits for the printer to signal its availability with a high acknowledge signal or a low busy signal. On receiving the appropriate signal, the computer sends the information that is to be printed. These characters, which are nothing more than electrical pulses, get sent at a rate of 400–600 characters per second.

Few printers can handle information this quickly. Since most are limited to printing at a much slower rate, typically 40–150 characters per second, the characters coming from the computer are stored in buffers, which may be in the printer or in the interface. When the buffers are full, the computer receives a signal to stop sending data. From that moment, the computer waits until the printer catches up and signals that it's ready for more data.

In a system with a tiny buffer, this waiting game can occur every few seconds until everything has been printed. If a big buffer is available, then the computer can send a large amount of data before it is interrupted. After sending the last packet of data, the computer becomes available for further use.



With a printer interface, you can connect your 64 or 128 to practically any printer, such as these multifont models from Star Micronics.

A Dip into History

Modern-day dot-matrix printers descend from line printers, dinosaurs that were used long ago when video monitors were prohibitively expensive. By firing a single column of six to eight pins as the printhead moved across the page, the line printer was able to reproduce characters and graphic shapes. Its printing speed was comparable with present standards, but the quality was terrible. The dots that made up the printout were visible from a mile away.

For those requiring better print quality, the only recourse was to acquire a heavy, expensive, noisy, and slow daisywheel printer. The daisywheel has all but disappeared with the advent of laser and ink-jet printers. (These latter printers still employ the dot-matrix method of printing, but they employ very tiny dots.)

Still on the Dot

Despite the poor quality of their early printouts, dot-matrix printers have remained popular. They've survived primarily by a fierce reduction in price, aided by an increase in features and a boost in print quality. In an effort to keep their customers and attract new ones, printer companies have increased the number of pins in the printhead, added color, and offered improved paper handling.

As lasers and ink jets continue to drop in price, it's quite possible that some day people will find it economical to have a laser printer for letter quality printouts and keep a dot-matrix printer on hand for printing multipart forms. Forms are beyond the capability of the mighty laser printer right now because it doesn't use impact technology.

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The print quality on today's dot-matrix printers is far from bad. Even 9-pin printers can produce near letter quality printouts by using multiple passes. This does affect printing speed, however. The printing speed in NLQ mode is about 30–50 percent slower than when printing in draft mode.

You may experience some reduction in print quality when using fanfold paper. Since the printer grips fanfold paper less firmly than friction-fed single sheets, you often get a line or two of text with jagged characters because of unavoidable paper movement between the multiple passes of the printhead. A 24-pin printhead avoids this problem by printing LQ characters in a single pass. Also, by using a denser dot-matrix (up to 30 × 48 dots per character as opposed to 18 × 18 on a 9-pin printer), a 24-pin printer produces letters that are better shaped with smoother curves than its 9-pin cousin. It generally prints faster, too.

Some Useful Features

As I mentioned earlier, prices of dot-matrix printers have dropped dramatically over the years, and to make them even more appealing, manufacturers have piled on the features. Here are a few that can make your printing sessions more enjoyable.

Paper parking. In older printers, at any given instant, you were limited to using either fanfold paper or single sheets. If you had fanfold paper in the printer and wanted to print on letterhead or other single-sheet stock, you had to remove the fanfold paper. When you'd finished with the single sheets, you then had to go through the whole tedious procedure of reloading and aligning the fanfold paper.

In newer printers, you don't have to remove fanfold paper in order to use single sheets. It can be "parked" out of the way while single sheets are used. When you're ready to switch back to fanfold, it can be brought back into position by moving a lever or pressing a switch.

In some printers, the parked paper is held in a curved shape. If the paper is left for a day or two like this, the curl can cause the paper to jam or at least give an unsightly top page on the next document that's printed.

Other printers hold the parked paper flat and don't have this curly problem. In fact, even when using fanfold paper, it's a good practice to park the paper at the end of each session. Paper left wrapped around the platen can definitely develop a curl, giving you a top page that looks unruly.

Zero-inch tear off. With earlier printers equipped with pull-tractors, when you finished printing a document, you normally had to advance the fanfold, tear off the printed pages, and then use friction feed to print the first half of the next page until it caught the tractor sprockets. You then took the printer offline, engaged the paper in the sprockets properly, disengaged the friction-feed, and printed the rest. It was as painful a procedure as it sounds.

This procedure was prone to numerous frustrating problems, especially when several people used the same printer. It was very easy to have misaligned sprocket holes. Often, someone would forget to disengage the friction setting after loading the fanfold. This situation usually occurred when you went for a cup of coffee after starting to print your 20-page document.

The other option was to use the fanfold from the beginning and to discard the blank top page. The trees would probably like to say something about this wasteful procedure.

In newer printers equipped with pushfeeds, it's possible to advance the page after printing, tear off the last printed page, and then retract the paper to the top printing position. Rather than going through the contortions outlined earlier, all you have to do is press a switch to move the paper.

Improved paper handling. Newer impact dot-matrix printers allow a greater adjustment of the gap between the printhead and the platen, thereby permitting the use of thicker forms. In general, paper handling is more positive, precise, and predictable on newer printers than on those from even a few years ago. The improvement makes it much easier to print envelopes, multipart forms, and labels.

Scalable fonts. No matter how good a regular font looks (even on 24-pin printers), the jaggies show up when you print them in double width or double height. Scalable fonts smooth out the jaggies. With them, new printers can print out slick-looking characters over a wide range of sizes. A few printers have scalable fonts built in, while others print those with the help of special software.

Quiet operation. While improved print quality attracts users, the noise that dot-matrix printers generate turns quite a few prospective users away. A typical workhorse, churning out 40–80 cps in letter quality mode, is noisy enough to render nearby conversation impossible. Printer hoods can bring the noise down considerably, but they take away easy access to the printer's controls and paper.

Most new printers come with a quiet

PRINTER LIFESAVERS

Dot-matrix printers typically need minimal care, but here are a few things to keep them online even longer.

- Use the best quality paper. Cheap paper sheds a lot of minute particles. This paper dust can mix with lubricants to form a dough that can clog moving parts.
- Clean the printer by lightly vacuuming, taking care not to touch ICs, cables, or other electronic parts. Static electricity generated during vacuuming can be damaging.
- Smoking, eating, and drinking near computer equipment is like playing Russian roulette! You'll win most of the time, but you'll remember the time you lose.
- Once or twice a year, depending on usage, clean the guide rail supporting the print head with a dry lint-free cloth. Lubricate the rail sparingly with a very light oil.
- Once a year, clean the rubber platen and paper bail rollers with ethanol (or special cleaning solution available for this purpose from office supply stores) and with a rubber-conditioning compound.
- If the print head becomes dirty and begins to smudge printouts, remove the ribbon and then use a strip of lint-free wipes, moistened in alcohol to gently floss the print head and the ribbon mask (the plastic or metal frame that lies between the print head and the paper).
- Never use a ribbon with a weak area, one that appears as a translucent patch when the ribbon is viewed against light. Don't use one that has an actual tear in it as this could snag the print head pins.
- Never use the printer for extended periods of time. Most printers have a detector that shuts the printer down automatically when the print head overheats. When printing more than a few pages, it's wise to leave the cover open for promoting ventilation.
- Re-inking a printer ribbon might appeal to the Scrooge in you, but it could cost you the print head! For proper operation, ribbons need to have the right amount of ink and lubricant. Darker printing ribbons may look good on paper, but they generally have less lubricants. A cheap ribbon that's short on lubricant could rip and catch the delicate pins, costing you an expensive print head replacement.

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mode, which reduces the printing noise by slowing down the printing speed. Panasonic, followed by others, has gone beyond this technique to equip newer printers with quieter moving parts and added insulation. There's even a superquiet mode that alters the method of firing pins in two passes. Even at regular speeds, these printers are supposed to produce about 1/8 as much noise as earlier printers.

Color. Practically all self-respecting dot-matrix printer manufacturers now have at least one model that prints in color. Color printers use a ribbon with tracks of colored ink and a motor which moves the ribbon up and down to bring one of the (usually) four-colored bands against the printing pins. By printing in one color and then reprinting over it in another color, up to seven colors can be generated.

Since accurate registration of superimposed characters is essential, most of the printers become unidirectional when printing in color. The resultant output is slower than when the printer is printing with a black ribbon, but the only other alternative would be to purchase an ink jet or color laser costing many times more.

Color intensity varies from printer to printer, and one band of color in the ribbons usually dries out faster than the others, leading to shifts in hue over a period of use. Colored ribbons are generally two to three times more expensive than black ribbon, and they have a shorter life.

Improved printhead movement. Printers rely on major movement in two directions. The paper moves up and down (vertical movement) while the printhead moves left and right (lateral movement). Some heads rest at the left edge of the printing line, while others rest in the middle. Most heads print a line from left to right and then the next line from right to left. Printers that use this bidirectional printing can often figure out after printing a line whether it would be quicker to start the next line from the left or right edge (logic-seeking).

When printing graphics, you can either select bidirectional or unidirectional movement for improving vertical alignment, the lack of which shows up when printing a long vertical straight line. The faster a printer is, the more likely it is to print a vertical line that appears to zigzag. Some printers compensate for this by allowing you to adjust the timing for the printhead to reach the starting point for each line (bidirectional timing adjustment).

As a printer grows old and the cog belts that move the head become loose, the misalignment becomes more noticeable. By adjusting the timing, you can get a few more miles out of it before you'll be forced to see a service technician.

Printheads must move parallel to the platen (paper) in order to make an even impression across the page. With age, this alignment could go out of whack, resulting in printouts with a darker left or right edge. A sawtooth test pattern that can be generated on some printers can readily reveal such a misalignment. The adjustment that corrects this problem shouldn't be attempted by an untrained person. This adjustment may also be required when replacing the printhead. (Such replacements aren't common unless you are heavily into printing bitmapped images and large banners.)

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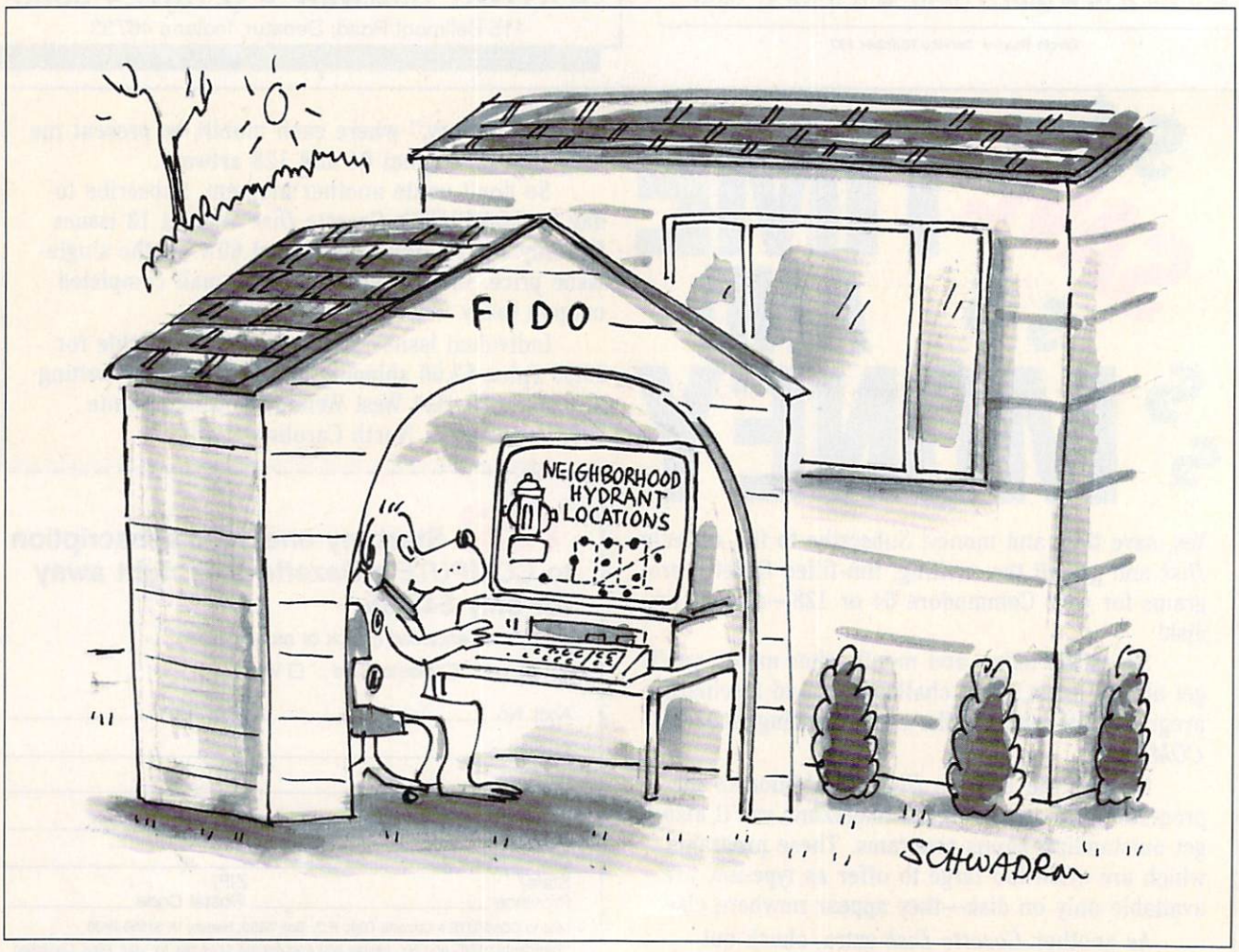

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BBU AND BBG

Experts said these products could never be made. It's a good thing Performance Peripherals didn't hear that, or it might not have created BBU and BBG. BBU is a battery backup cartridge for the 64 or 128 that provides permanent memory (nonvolatile) for Commodore RAM expansion units and geoRAM. BBG is a backup RAM disk for GEOS 2.0, GEOS 128, or Gateway (CMD's GEOS system). BBG is available in sizes ranging from 512K to 2MB.

BBU

One RAM cartridge technician told me that if a battery backup for an REU were developed, it would be the size of a car battery and wouldn't hold power for more than a few minutes. BBU uses an AC power supply backed up by four D batteries. While the power must be on for the cartridge contents to be accessible, I have left only the batteries connected for over a day without any loss of cartridge memory. With care, cartridge portability between computers should be possible as long as the batteries are connected.

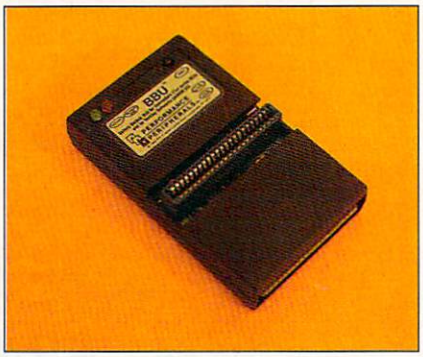
BBU allows an REU to be used in its normal way. If you don't initialize the REU when you load the Commodore RAMDOS, whatever was previously stored in the REU will still be available. In my case, I've found programs that I'd copied between disks, SpeedScript, and images used by The Print Shop still in memory. Of course, if the program you use automatically initializes the REU, then its memory will be erased.

The Write Stuff word processor lets you use an REU to store its large dictionary and text files. I know an operator of a mail-order business who uses this word processor, and he would leave his 64 turned on from Monday to Friday, just to be sure he didn't lose anything. With BBU, the computer can be turned off without the fear of losing any files.

Many BBU users will place GEOS or Gateway in their cartridges. When Rboot is loaded from disk, GEOS and all required files are available in less than eight seconds. This technique makes GEOS a true operating system, since it no longer has to be loaded from disk like a program.

BBG

BBG doesn't use an REU. It holds only GEOS 2.0 or Gateway. Loading BBG Rboot from a floppy disk provides equally fast access to the cartridge contents. This backup cartridge is available in sizes ranging from 512K to 2MB. If GEOS 2.0 is used with the provided



BBU is a battery backup interface module for 1700- series REUs and geoRAM 512.

BBG is a battery backup RAM disk for GEOS 2.0 and GEOS 128.

software, the cartridge configures itself in sections like the 1750-series RAM disk. On the 2MB model, this is like having five RAM disks. If Gateway is used, BBG is configured as one large RAM disk. With Gateway's Slider and Browse functions, this makes all files easily accessible.

The Aprospand board has four slots that allow up to four cartridges to be switched on or off with a 64 or 128. I have connected one of these boards to my cartridge port via a ribbon extender. This ribbon allows more economical use of table space. In the Aprospand slots I have connected a Quick Brown Box (QBB) and BBU connected to a 1750 REU. A QBB-specific version of The Write Stuff word processor is in the QBB; the BBU-REU combination contains Gateway. With this setup, it's possible to stop writing in the middle of a text document, load geoTerm from the REU in eight seconds, and return to my word processor with no loss of text.

The Aprospand makes another interesting combination possible. I have used one board to access both BBU and BBG. I placed Gateway in both, and found that I could run GEOS from either with no interference from the other. This could increase your total available RAM for GEOS (separately accessible), or allow use of GEOS in one cartridge and Gateway in the other, since each system has different advantages. Employment of BBG and BBU together would require ordering BBG with the optional disable switch, so that it would not be available when BBU was being accessed. A reset switch is standard with BBU and available as an option with BBG.

None of my other cartridges works with either BBG or BBU. In order to use Gateway in my BBU-REU combination, I have sacrificed the ability to use the REU with other programs for fast disk and file copying.

Many Commodore users will choose to place BBG or BBU directly in their cartridge ports. This is how BBG and BBU were designed to be used. There should be no problems for any 64 or 128 with this configuration.

For very little money, REU owners can turn their 64s into permanent-memory machines with several thousand kilobytes of memory. GEOS users who don't own an REU should appreciate BBG especially for the large memory it offers. It's a tribute to Peter Fiset, the designer of both BBG and BBU, that a number of other combinations are possible with these devices.

Fiset is in a sense competing against himself, since he also developed the CMD RAMDrive, but RAMDrive is more expensive than these cartridges. BBU and BBG are for those of us who don't have a large budget, and who have more specific needs for our computers.

Although the experts said it couldn't

be done, Fiset went ahead and proved them wrong. I, for one, am glad he was successful.

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The manual describes I Paint as producing hi-res interlaced color graphics for the 128D. I immediately found myself wondering what *interlaced* meant. I didn't have to look any further than the manual for an explanation.

Basically, a video image is made up of horizontal scan lines which are broken into two fields, one displaying even lines and the other odd lines. If an image is interlaced, the image of one field appears between the lines of the other field. This method doubles the number of lines holding information, which in turn doubles the vertical pixel resolution. I realize that this probably doesn't make much sense to a lot of computer users, but this is what gives you the greater resolution and all of the apparent colors. After all, interlaced graphics is what this program is about.

Getting started with the program posed a problem for me. I couldn't get it to load with my 1571 drive. The author provided me with a new program, but the same problem still plagued me. Finally, we hooked up a 1541 drive,

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and the program loaded. The author took my disk and loaded it with his 1571 drive, so I'm inclined to think my drive was to blame.

To start, plug your mouse into port 1 and then boot the program. The first menu provides four options: Start, Setup, Install RAMDOS, or Exit. For the first time, choose Start. You can play around with the Setup process later. When you get around to setting up the program, one of the choices involves the mouse. It can be set up as either a left-handed or right-handed mouse. The setup configures the On button under your index finger and the Off button under your middle finger.

The next menu will be the main menu, which will present a selection of 14 options. These are Pen, Brush, Spray Can, Shapes, Fill, Palette, Magnify, Areas, Drawmode, Text, Files, Print, Options, and Clear. You'll notice that the Pen icon will be reversed. This indicates that the Pen mode is active. From this point on, the artist in you is given the freedom and power to create works from the most simple to the intricately involved.

I'm not an artist—computer or otherwise—but as I sat in front of the computer drawing cute little geometrical shapes and filling them in with different blocks of color, I felt rather creative and proud of what I could do with this program. Then I loaded some files of pictures the author had supplied. The impact of what could be done with this program was overwhelming. For the person who enjoys computer-aided drawing and creating personal designs, this is an ideal program.

You are provided with three modes of freehand drawing: Pen, Brush, and Spray Can. Each of these modes allows you to clip and paste and select colors while maintaining your choice of drawing mode. Each is represented by an icon on the main menu.

The Palette icon on the main menu calls up its own menu when clicked on. In the color mode, ink and paper colors are selected for both fields of the interlace screen. There are 16 colors from which to choose. By clicking on the palette on the submenu, you enter the Color Wash mode. Here, you are able to change colors without affecting the bitmap data. It is well worth the time to experiment with the effects that can be created using the various coloring combinations.

I Paint includes all of the basic tools that can be found in most drawing programs. It gives you the ability to clip,

paste, reverse, flip, and create patterns. There's also a text mode that offers a choice of six fonts, a system font, and one loadable custom font. You can manipulate text as to its direction on the drawing and character size, and there are six other options for greater flexibility and creativity.

My only real complaint is that the program is slow to load and to print out my creations, but we can thank Commodore for that. Perhaps even that drawback has its advantage. I can start loading the program, go make my necessary cup of tea, and be back at the computer ready to work by the time that the program has loaded.

I Paint is a powerful graphics program. It's loaded with features that time and space don't allow me to go into, so I can't give them their proper due. If you're the type of person who enjoys drawing at the computer and creating graphic designs, then this program is well worth your time and financial investment.

CHERYL SCHUH

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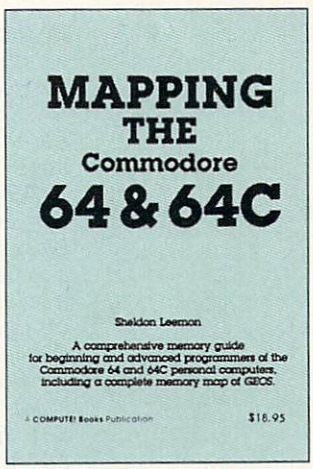

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FEEDBACK

Questions and answers about switching out ROM to get more RAM, printers, interfaces, and more

More RAM

I know the 64 has 8K of RAM under BASIC ROM at 40960–49151 and that it can be used as long as BASIC isn't being used. Which machine language LDA and STA do I need to use to switch between ROM and RAM?

NICOLE BLAKE
NEW YORK, NY

I'd like to write a program entirely in ML, but I need about 50K of free RAM. My machine language book says I can free a memory block from $0801 to $CFFF with LDA #$36: STA $01. But when I do this, the computer crashes. Either something's wrong with my computer or I can't use this free RAM in direct mode. Can you tell me how can I program this memory?

JASPER HOUK
QUINBY CUL, VA

Bit 0 of location 1 determines whether the computer sees memory at $A000–$BFFF as BASIC ROM or as the RAM underneath. Bit 1, likewise, sees memory at $E000–$FFFF as Kernal ROM or as the RAM underneath. If either bit is on, ROM is enabled. If both are off, the memory is available. On the 64, to turn off the BASIC ROM, store a $06 into location $01. To turn off both BASIC and Kernal ROM, store a $04 in location $01. To recover both, store a $07 in the same location. You mustn't turn off the Kernal ROM with BASIC ROM still engaged because BASIC relies upon the Kernal.

If you make this memory available without copying ROM to the RAM underneath, you pay a price—you lose BASIC ROM and/or Kernal ROM. BASIC is gone, which is fine if you're writing a program entirely in ML and if the program doesn't call any built-in ROM routines from that area. But you must store a $07 to location $01 before you end the ML program and return to direct mode. BASIC is in charge of monitoring your keypresses, printing them to the screen, and interpreting commands (such as RUN or SYS) that you might type. If you've switched out BASIC, direct mode will seem to be locked up.

What about the case where you've copied the ROM routines to the RAM underneath? Well, as long as the process was done correctly and that RAM wasn't overwritten later, switching out ROM should be no problem. The correct way of writing BASIC ROM to RAM is as simple as the following.

```
FOR X=40960 TO 49151: POKE X,
PEEK(X): NEXT
```

Just modify the range to cover the addresses from 57344 to 65535 if you want the Kernal ROM copied also. Whatever you do, don't disable BASIC until after this routine has run, because it uses BASIC to work!

Software or Interface?

I have a 64, a 1541 disk drive, an Epson RX-80 printer, and a Turboprint/GT interface. I wrote a multipage report in Homeword with top, bottom, and side borders defined according to the word processor's instructions. When the report was printed, the first page was OK, but each succeeding page went beyond the bottom border and crossed over the page serrations.

When I initially set up the printer and interface, I set the DIP switches by the instructions. I did find that I had to set one on the printer to off to prevent double-spacing because the computer controls the linefeed. The test program built into the printer worked perfectly across multipage prints, recognizing the end of the page and going to the next page.

Am I the one at fault? Or is the problem with the software or the interface?

SCARLET LYNCH
WAYCROSS, GA

There are a couple of solutions to your problem. But first here's an explanation which applies to printers and interfaces in general.

When the printer finishes printing a line, two things need to happen: The printhead should move to the beginning of the line, and the paper should advance one line. Traditionally, a carriage return (CR) only moves the printhead to the beginning of the line it's on. It can thus be used to print a line and go back to the beginning to underline or overstrike various characters that are already printed. A separate linefeed (LF) character causes the paper to move up a line. The ASCII codes for CR and LF are CHR$(13) and CHR$(10), respectively.

Commodore printers and screens use only a CR at the end of a line. In this case, CHR$(13) means move to the beginning of a line and move to the next line. It also means you need to add a linefeed when you print something to the printer.

The printer, the interface, and the computer are all programmable. There are a variety of ASCII codes you can use to send commands to each of them. In addition, printers and interfaces generally have rows of DIP switches you can set to create various effects.

All three devices—the computer, the interface, and the printer—are capable of adding the linefeed. The question

is, who's in charge? If no device adds a CHR$(10), everything will print on the same line. On the other hand, you could have a program that sends a 13 plus a 10. The interface sees the 13 and adds another CHR$(10), and the printer says to itself, "Aha, a 13 just arrived. I'd better add a linefeed." In this case, you'd have triple spacing.

It doesn't really matter which device adds the linefeed, as long as one (and only one) does so.

The same idea applies to skipping over the perforation at the end of the page. You've indicated that the printer is set to skip over the perforation. The printer keeps a tally of how many lines have been printed so far. When the page is nearly full, it skips ahead a few lines to start a new page.

The problem is that your word processing program is doing the same thing. When it approaches the bottom of a page, it sends some blank lines. In the meantime, the printer has also decided to move to the next page and, when it gets there, starts printing the blank lines the computer has sent.

You'll have to decide who's in charge of skipping over the perforation between pages. If it's the printer, then set the word processing program to have no margin at the top or bottom. If the word processor controls the margins, then you'll have to turn off the automatic paging feature of the printer.

Empty Arrays

I'm writing a program on my 128 using 80 columns, and I'm having a problem handling arrays. If no data is entered in an array, the data doesn't stay where I put it. The first time through the program, everything is where it should be. On each subsequent reading of the sequential file, data shifts to the left to fill any empty arrays.

ALVIN DWINDLE
MCLEAN, VA

When you create an array using DIM, numeric arrays are initialized to 0s, and string arrays are initialized to null strings. A null string contains no characters; it's a string full of nothing. If you open a sequential file and write a null string to it, you're writing nothing at all to the file. A PRINT# statement generally adds a carriage return—CHR$(13)—after each string or number, so if you examine the contents of the file, you'll see a CHR$(13) only. We experimented a bit with sequential files and discovered that INPUT# doesn't like null strings. For example, if you PRINT# "ABC" followed by a null string and then "DEF" and read through the characters (with GET#), you'll see 65, 66, 67, 13, 13, 68, 69, 70, 13—three ASCII characters for ABC, a 13, nothing for the null string, another 13, then three ASCII characters for DEF, followed by another 13 (carriage return).

If you INPUT# from the file, you'll receive an ABC and a DEF, but no null string. This is true in both 64 and 128 modes.

A couple of solutions are available. The first is to avoid writing a null string if you're going to use INPUT# to read the file. Instead, send some character to indicate a null entry. INPUT and INPUT# ignore leading spaces, so don't send a space. You should be able to use any other character—including a shifted space, CHR$ (160). The second is to avoid using INPUT#. If you use GET# to retrieve one character at a time, you can concatenate the string until it encounters a CHR$(13).

Graphics Mode

Working with arrays and printing variables in graphics mode on the 128

While trying to write a simulation program for the Commodore 128, I can't get variables to print in the graphics mode. Here is part of my program.

```
10 GRAPHIC 1,1
15 H=180
20 CHAR 1,5,5,"HEADING:"
   ;H
```

The variable in line 20 doesn't print out. what's wrong?

STEVE PETTIGREW
COLTON, CA

BASIC 7.0's CHAR statement won't print the value of a numeric variable; it will display only strings (or the contents of string variables). Fortunately, BASIC provides a simple way to generate a string containing the digits of a numeric variable—the STR$ function. For example, A$=STR$(123) produces the same result as A$="123", and STR$(H) will produce the string equivalent of the value of the numeric variable H. There's just one other consideration: Unlike PRINT, CHAR will display only a single string, so you can't use print separators like the semicolon you have in line 20 above. Instead, you must use the + operator to concatenate (join) any substrings into a single string. Here's a workable version of line 20 for your program fragment:

```
20 CHAR 1,5,5,"HEADING: "
   +STR$(H)
```

Do you have a question or comment? Have you discovered something that could help other Commodore users? Write to Gazette Feedback, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. ❐

PD PICKS

Steve Vander Ark

1581 UTILITIES

For the past two issues I've been rummaging around in QuantumLinks's more exciting (sillier?) corners, pulling out some dynamite games—the kind of games that'll keep you glued to your monitor for hours. Hey, I happen to like games! So, sue me!

But enough games! How about something for you 1581 users? This month I figured I'd dish up something a little different: utilities—some really excellent, head-banging utilities. A contradiction of terms, you say? Not on your life. Utilities have their own kind of cool, especially the ones I've scrounged up for you. The point is, when you need utilities, these will do the job with that little extra oompf that almost makes the work fun.

Here are a couple of excellent, head-banging utilities that'll make managing a 1581 drive almost fun.

If you're humming "Spoonful of Sugar" now and shaking your head, just hang on. You need to format a disk and rearrange a directory now and then, same as anyone else. Unless you get a thrill out of memorizing BASIC's gobbledygook commands, you'll be glad to have these utilities around. Trust me!

1581 Disk Utilities

By Joe Gilberto
Q-Link filename: 1581 UT-128R1.5, uploaded by DrJoe. This program requires a 128 with a 1581 or other drive and an 80-column monitor.

It's hard to find a good disk utility on Q-Link by simply browsing the libraries. Every one of the myriad files in that area has the name Disk Utility, which tells you nothing. That's why I'm all for gutsy names, the kind that get your attention. Fortunately, Q-Link users often leave comments on files after they've downloaded them and taken them for a spin. I started perusing the comments and quickly narrowed the utilities down to just a few that really have some substance.

This nifty program was the winner, hands down. I do wish it had a snazzier name, something macho like Disk Commander or clever like Disk-Functional or even just plain weird like DisKom-BooBaLate. A good name would make you want to try this puppy out. But it's a utility, so it's got a boring name.

You won't have to look deeper than a sprite or two to notice this program's elegant touches. It uses windows to set up the 80-column screen in two sections, one for the menu of options and the other for displaying disk directories. It does this with all the sleekness of a Jaguar parked in front of the opera. It flips you back and forth between menus just as smoothly, always taking you where you want to go in the program with quiet ease. Unobtrusive prompts remind you to turn up your monitor's sound so you'll get the full effect of the SID chip's contribution.

I don't know why, but the 80-column screen always seems to have its own special elegance, a kind of ambience of efficiency with a touch of a smile. If you don't have a clue as to what I'm talking about, check out this program for a good example.

Its list of options includes all the usual disk and file functions: copying, renaming, deleting, and so on. The 1581 drive in particular is supported with numerous features designed for that device only. The program works with CMD's RAM devices, but not between their partitions. If you do heavy-duty work on those devices, you're better off with CMD's own utility disks.

And last but not least, get a load of that error sound! There's no way I can describe it to you, but it's almost worth getting this program just to hear it!

1581 Directory Assistant

By Captain Morgan
Q-Link filename: 1581DIR/CAPCODE, uploaded by Dakkri. This program works with a 1581 and a 64 or 128.

I have been running myself ragged trying to find a 64 disk utility program with as much pizazz as the 128's 1581 Disk Utilities. This one, 1581 Directory Assistant, is similar, with a slick opening graphics screen and interface. In addition to the usual formatting and file handling, it features an option to add a dashed line in the directory listing to separate group files.

There are a few drawbacks to this program. For one thing, it didn't seem to want to recognize my CMD FD-4000 disk drive as a 1581, even though I had a 1581-format disk in the drive. That surprised me, since the FD has always doubled as a 1581 without the slightest hitch. Second—and this will affect more of you—this program is for the 1581 drive only; it includes no commands for the 1541, 1571, or any RAM device. I know that quite a few of you use one of those other types of drives at least as much as you do a 1581, so this utility must be only one of several you'll need to get your work done.

But don't get me wrong; this program is a very nice piece of work. It does what it's supposed to and even manages to do it with a little flair. The author has tried to include every type of 1581 option he could imagine.

So if you have a 1581, you'll want to check out these two programs. Look for them on a BBS near you, on QuantumLink, or on this month's Gazette Disk. ❐

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MACHINE LANGUAGE

Jim Butterfield

BOOT BASICS

Load and run a machine language program from within a BASIC one.

There are several ways to choose a location for a machine language program. One good method is to stick it onto the end of a BASIC program. That way, BASIC and ML will load together. A method that I often use in this column is to poke the program into a chosen part of memory.

When a machine language program is located away from its BASIC driver, it's often necessary for the BASIC and ML programs to be loaded in separate actions. To spare the user from the need to type a complex loading sequence, programmers use boot programs.

A boot program may load many items into various parts of memory. For example, you could have it load a video screen, a machine language program, and a music player.

We'll look at a simple boot program that loads a machine language program from disk and then proceeds to call it as needed. First, let's create a very simple ML program that prints the message *HELLO.*

```
2000  LDX  #$00
2002  LDA  $200E,X
      JSR  $FFD2
      INX
      CPX  #$07
      BNE  $2002
      RTS
0200E 48 45 4C 4C 4F 21 0D
```

Using a machine language monitor program, you could enter the code almost exactly as shown above and then save it to disk with a command such as: S "HI.ML",08,2000,2015. You could also create the program using the following BASIC program.

```
100 REM HELLO ML MAKER
110 DATA 0,32
120 DATA 162,0,189,14,32,32,
    210,255
130 DATA 232,224,7,208,245,96
140 DATA 72,69,76,76,79,33,13
200 OPEN 1,8,2,"0:HI.ML,P,W"
210 READ A:T=T+A
220 PRINT#1,CHR$(A);
230 N=N+1
240 IF N<23 GOTO 210
250 CLOSE 1
260 PRINT "FILE WRITTEN!"
270 IF T<>2356 THEN PRINT
    " . . . WRONG!"
```

Do not overlook the semicolon at the end of line 220. Run the program, and it will generate file HI.ML. Later, if you enter *LOAD "HI.ML",8,1* followed by *SYS 8192,* the program prints *HELLO!* The extra ,1 at the end of the LOAD command forces the program to be loaded without relocation at address hex 2000 (decimal 8192).

Now, we'll ask a BASIC program to act as a boot, bringing in our HI.ML program and then calling upon it to perform the greeting. Before we do, however, we must go to "boot camp" and learn some new rules.

On the Commodore 128, command BLOAD "HI.ML" would do everything we needed: It would bring in the program and allow us to continue with more code. On other machines, we must deal with the chain effect.

When a program brings something into memory using LOAD, a curious thing happens. The program returns to its first statement because the computer anticipates a chain, a program destroying itself by loading in a fresh program over its own memory space.

It's fun to work with BASIC chaining, getting one program to do some work, then calling in another program to continue the job. That's not our task here. But before we pick up our HI.ML job, here's a tip for those who would like to play with BASIC chaining: Programs loaded by chaining must be no bigger than the first program of the chain.

Back to our task. We wish to load the machine language program into memory, but this loading action will cause our program to go back to its first statement. That's almost the same as the program starting over, except that now the program's variables could contain values. You might think that the program must end up caught in a loop. First, it will load, then it will go back and load, and so on. But there's a way around this problem.

When a program goes back to its first statement after performing LOAD, it doesn't lose its variable values. Suppose the first program statement is IF X=1 GOTO. When the program starts, all variables, X included, are 0. So we won't take the GOTO branch. As our program continues, we may now set X=1 and then LOAD. The program will return to its first statement, but this time it will take the GOTO and then proceed.

The following code uses ON X instead of if X=1, but the principle is the same. When we start, the program proceeds to lines 110 and 120 and executes the LOAD command. The program never reaches line 130; instead, it returns to its first statement. This time, X has a value of 1, so the program immediately leaps to line 200.

Here's the tiny program. Don't forget to use the command NEW before entering it.

```
100 ON X GOTO 200
110 X=1
120 LOAD "HI.ML",8,1
130 STOP
200 PRINT "ML NOW
    LOADED"
210 SYS 8192
220 END
```

Can you see why the program never reaches line 130? ❐

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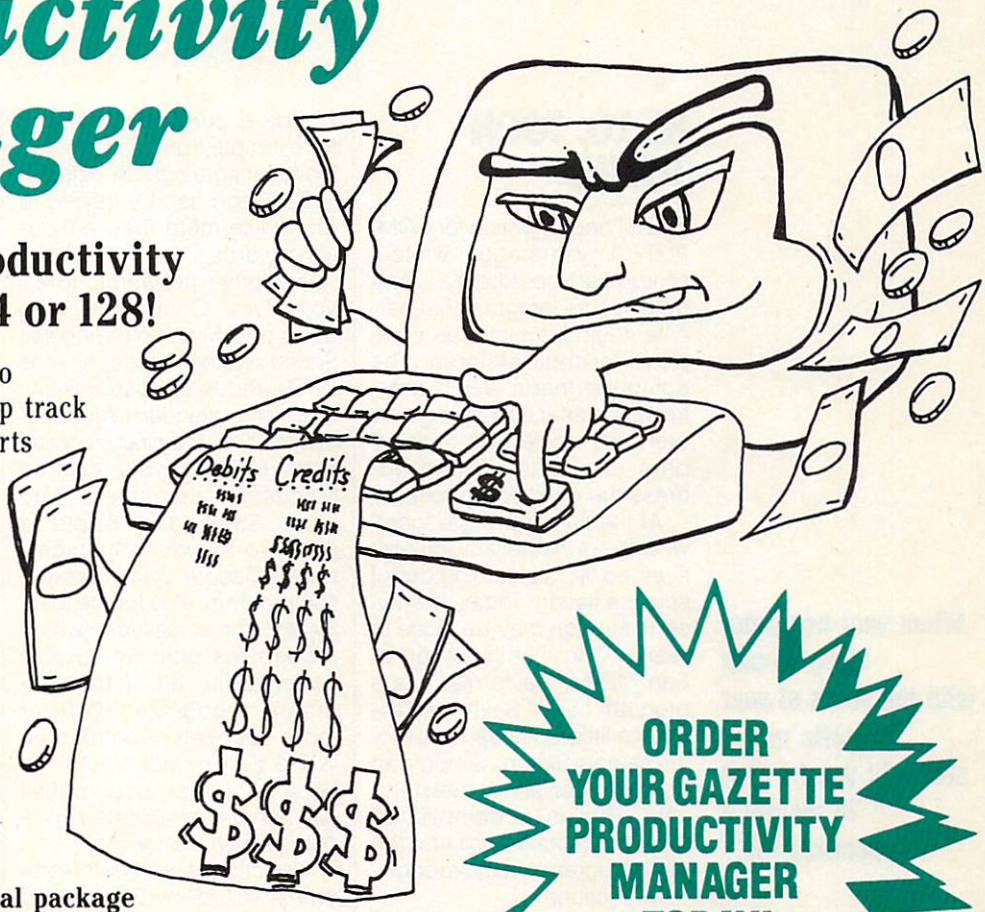

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D'IVERSIONS

Fred D'Ignazio

HELLO, TOON TOWN!

When your computer starts to talk with the voice of your favorite movie star, will you be cast in merely a supporting role?

When I began writing for COMPUTE 11 years ago, I wrote a series of articles about a "computer friend" program that parents could load into the computer for their children. The computer friend was a user-friendly interface for young children that would take their orders, play games, and address the children by name.

At the time, having a friend who lived inside a computer seemed like something out of science fiction. Today, however, this vision may be close to reality. The Qualix Group in San Mateo, California, has a program called SayIt that features a little onscreen character named Simon. Simon can actually hear and understand you. This is accomplished through a sound card and the SayIt program's voice-recognition functions.

When the program is first loaded into the computer, Simon pops onto the screen in ready mode. Once you attach a microphone and activate him, he puts his hand to his ear and announces that he's listening for your first voice command. If he understands your command, he gives you the thumbs-up sign. If he can't understand your command, he scratches his head to show you that he's confused. If you don't want him eavesdropping on your regular conversations, you issue the voice command, "Cover your ears!" and he puts his fingers in his ears to show you that he's not listening.

Voice-recognition programs aren't new. What is new is personalizing the program with a computer friend like Simon. Even more important, the newest programs have far greater power than their older counterparts, and they run on standard computers. Simon, for example, runs only on Sun Workstations, but he costs only $295 and can be trained to recognize more than a thousand words.

Two other programs, IBM's VoiceType Control for Windows and Microsoft Windows Sound System cost even less ($129 and $289 respectively) and run on standard Windows-based PCs. A similar program, Voice Navigator SW, runs on Macintosh computers and costs $399, and Apple is about to introduce its highly touted Caspar voice-recognition program, also for the Mac. Except for VoiceType (which recognizes only 64 spoken commands), all of the programs recognize 1000 or more spoken commands. While they're not up to the pace of normal speech, they can handle complicated commands if spoken slowly.

It's not clear yet if all the programs will follow SayIt's lead with a cute, friendly character like Simon, but it is clear that these programs will revolutionize the way we use computers. And the newer speech-recognition programs are coupled with high-fidelity speech synthesis programs that let the computer talk back.

One immediate application of the new speech technology that is already available to all of us (even those of us without PCs) is AT&T's new talking telephone that was introduced nationwide last summer. When you dial *O* in many parts of the country, you no longer get a human operator. Instead, you get a computer equipped with speech recognition and speech synthesis. The computer prompts you to place your collect, person-to-person, or credit-card call. If it can't understand you, however, it's supposed to ask a human operator to step in.

Theoretically, this is great, but sometimes things don't work as we would like. For example, last week my 14-year-old son Eric was downtown, and he needed his mother to pick him up in the car when it started to rain. He had no money, so he dialed *O* to place a collect call to our home. When my wife answered the phone, she heard Eric identifying himself to the computer operator. "Eric D'Ignazio," he said.

"I don't understand you," said the computerized voice. "Please repeat."

"E-ric D'Ig-nay-zee-oh," Eric repeated, enunciating slowly and clearly.

"I don't understand you," the computer said. And it hung up!

Eric has spent 14 years in the company of a mad hacker father, so he's learned to be tolerant of computers. He promptly redialed and tried his luck again. Still no luck. He tried again. No luck. Finally, Eric gave up and walked home in the cold, pouring rain.

When he arrived home, dripping wet and sneezing, he and his mother vowed that the next time this happened, they would rip the offending pay phone from the wall and deliver it personally to the local telephone company executives who have replaced human operators with brain-damaged computers who can't understand English!

Unfortunately, even the phone company's advanced voice-recognition systems are far from perfect. If you have a stuffy nose or a frog in your throat, it's less likely that the computer will understand your spoken commands. Also, background noise can mix with your voice and confuse the computer. So it seems that even though we are stuck with computer operators, it may still be some time before they can even remotely be classified as computer friends.

But the real frontiers in human-computer relations still lie ahead. Imagine a whole office full of talking, listening computers. If the experts are right and the keyboard really is a dinosaur, then in the future we'll all be communicating with our computers via voice. We'll give a verbal order to our computers, and they will respond with a verbal reply. If only one or two workers in the office are carrying on conversations with their computers, then it's little more than a nuisance or curiosity to the other workers. But can you imagine five, ten, or twenty people firing off voice commands to their computers and their computers answering back? Remember, too, that most people tend to talk to a computer in a loud voice in order to make sure that the computer understands. They also speak to the computer slowly and clearly as if the computer were a not-so-bright servant or pet.

The result is obvious: computer cacophony. But that's not the worst of it. With voice-sensitive computers sitting on everyone's desktop, it's likely that a command intended for one computer will mistakenly be obeyed by another computer. Having an office full of eavesdropping computers could lead to catastrophe if someone orders one computer to delete a file or format a disk. It could also lead to office-wide insanity if a number of commands are picked up by other people's computers and they start dialing telephones, changing thermostats, turning off lights, printing documents, and playing music files and voice mail.

We may have to adopt radical methods to curb this computer eavesdropping and cacophony. One solution is to make computer microphones highly directional and ultrasensitive. This would permit us to become highly intimate with our computers. We could lean over them confidentially and whisper sweet commands into their tiny little ears. Another solution would be for us to stagger our working hours so that we could come into the office late at odd hours to have our serious human-to-computer conversations.

This is only the tip of the iceberg. When talking and listening computers really invade our offices, we'll generate enough materials to keep psychologists, sociologists, and comedians happy for years. Since most computers are going portable, this new human-machine relationship will not be confined to the office.

Our little chatty computers will soon go under our arms to libraries, onto airplanes, and into classrooms and auditoriums. And judging from the new generation of talking screen savers and software that licenses the voices of famous celebrities and personalities, we'll soon be inundated with a symphony of little voices that sound like Ronald Reagan, Clint Eastwood, Scotty on the Starship *Enterprise,* and Rod Serling on "The Twilight Zone."

We'll want to personalize our computers and turn them into cute little pets. We'll want our computers to speak to us in the voice of our favorite rock musician, politician, or soap opera star. The cumulative effect will be an intense feeling of vertigo, as if we had fallen into a Roger Rabbit cartoon and were surrounded by animated characters and disembodied voices. The result will be that the real world, already disorienting and absurd, may soon come to resemble a kind of cybernetic Toon Town. And we'll be wondering if we're just one of the players. ❐

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BEGINNER BASIC

Larry Cotton

READING DATA

Data is one of the more common words in computer lingo, ranking right up there with the words *bytes* and *RAM*. Data is what the computer uses to solve problems, create images, make music, or write letters. Data consists of words that are processed, numbers that are crunched, and points to which lines are connected.

Data can be processed once it's in the computer, but how does it get there? The answer to that question depends on the programmer and on how the program is constructed. Data is often written into the program itself, in which case the BASIC keywords *READ* and *DATA* are necessary to process it. Here's a simple example.

As the raw material that a computer processes, data can be either part of the program or entered by the user.

```
10 READ A,B
20 PRINT A+B
30 DATA 4,5
```

This program reads two pieces of data in line 30 which the programmer has included as part of the program. It then adds the two data items and prints the sum. The syntax of READ and DATA statements is very important. Make sure that the variable names (such as A and B) and the data itself are separated by commas, not periods or spaces.

When the computer encounters the command READ, it immediately looks for variable values to read. In this case, since A and B are numeric variables (as opposed to variables which represent words), the computer looks for two numbers to read in a DATA line. If more than two numbers are in the DATA line, the above program will read only the first two. If the DATA line contains less than two numbers, the program will stop with an *OUT-OF-DATA* error message.

To get the computer to handle words (known as literal or string data), we have to make a few changes.

```
10 READ A$,B$
20 PRINT A$+" "+B$
30 DATA BILL,CLINTON
```

The dollar sign denotes a string variable. A$ (pronounced A string) and B$ are treated literally. So, if the data were numbers, as string variables, A$ and B$ can't be mathematically manipulated (such as added or divided.)

Of course, you can do many other things with data. Here's an example using mixed data types.

```
10 READ A$,B$,A,B
20 PRINT A$" IS"A"AND "B$
   "IS"B
30 DATA BONNIE,CLYDE,40,42
```

The variables and the data must have matching formats and be in the proper order. While a string variable can read a number, a numeric variable can't read a string.

Arrays—the pigeonholes I mentioned last month—can be filled with data as follows.

```
10 FOR T=1 TO 8
20 READ A(T)
30 PRINT A(T)
40 NEXT
50 DATA 11,6,4,12,30,5,214,67
```

This example uses a FOR-NEXT loop to fill an array with data, a very useful technique for manipulating lots of information. A(1) will become 11, A(2) will become 6, and so on. Can you begin to see the implications for using arrays to store data?

Incidentally, if your array has more than ten entries, you must add a DIM statement at the beginning of the program. This statement sets aside space within the computer's memory to store the data.

```
10 DIM N$(15)
20 FOR J=1 TO 15
30 READ N$(J)
40 NEXT
50 DATA TOM,DICK,HARRY,
   JANE,SUE,BRENDA,SUZANNE,
   JIM,MARTIN,LOUISE,TERRY
60 DATA MADONNA,FLOPSY,
   MOPSY,COTTONTAIL
```

Again, make sure that the number of DATA items matches the size of your array. In this example, we've only filled the array; we haven't done anything with it. N$(3) will be HARRY, N$(12) will be MADONNA, and so on.

What you do with data is up to you. You can print it, write a story with it, multiply it, draw with it, list it, catalog it, and so on. But what if your data is changeable?

Suppose a class never has the same 15 students in it? You need to get information from the person who's using the program with the ubiquitous INPUT statement. We've reviewed INPUT recently, so I won't dwell on it now. Here's a simple example.

```
5 PRINT"[CLR][DOWN]PRESS
   RETURN AFTER EACH ENTRY."
10 PRINT:INPUT "HOW MANY
   CLASS MEMBERS";M
20 J=1:DIM N$(M):PRINT
30 INPUT"CLASS MEMBER
   NAME";CM$
40 N$(J)=CM$
50 IF J=M THEN 80
60 IF CM$=" " THEN 80
70 J=J+1:PRINT:GOTO 30
80 PRINT CHR$(147)
90 PRINT:PRINT"THE CLASS
    MEMBERS ARE":PRINT
100 FOR T=1 TO J:PRINT
    N$(T):NEXT
```

INPUT waits patiently until the person at the keyboard types something and presses the Return key. The data is stored in the N$(M) array.

Next month, we'll look at ways to save your precious data for future use! ❐

GEOS

Steve Vander Ark

BEEP! BEEP!

There's been a lot of noise coming from the IBM crowd lately. Most of it has to do with that GEOS clone that they call Windows. The latest pastime for Windows aficionados is to load sound bites that are then keyed to various system events.

Whenever you click on a button, Windows cranks out that digitized bit of sound that you've selected. For example, you might have the Roadrunner cartoon character utter his famous "Beep! Beep!" every time you close a window. These sound files are a lot of fun, and there are scads of them to be found on various bulletin boards and on commercial services such as GEnie and CompuServe.

Of course, the 64 was doing sound long before these IBM wonders were even born—and doing it better than anyone. Back when the IBM could barely beep, the 64 was gracing its games with three-voice sound produced by that amazing bit of electronics, the SID chip. With a few PEEKs and POKEs, any BASIC programmer could create sound and music.

It wasn't long before programs like Music Construction Set put the ability to create music within anyone's reach. When the 128 came along, its enhanced BASIC commands made programming simple. Six voices and stereo capabilities became possible when the SID Symphony cartridge (available now from Creative Micro Designs) added an extra SID chip to the Commodore system.

I realize that there's a difference between Commodore's multivoice music and Windows' digitized sounds, but the 64 is capable of playing digitized sounds, too. Its only limitation is memory, since digitized sound eats kilobytes about as fast as my daughter gobbles potato chips.

The premier program for importing and playing digitized sound files is DigiPlayer by Mark Dickenson. It's available on QuantumLink as shareware. (To help you download it more easily, its filename is DIGIPLAYER31.SDA, and it was uploaded by Mark AD I.)

OK, what's all this have to do with GEOS? There are a couple of programs on Q-Link that will let you import sound files converted with DigiPlayer into a format that GEOS can use. Since DigiPlayer files use the file extension RAW, I'll call them RAW files. One GEOS program which actually plays them is an auto-exec file called AUTORAW. (Filename: AUTORAW, uploaded by WillJ14.) Auto-exec files run automatically when you boot your system.

Let me give you an example of how you can put this technique to use. In the GEOS message area on Q-Link, several users report that they use geoRAW to signal when their system has finished booting. Many people use auto-exec files such as QwikStash to load a RAM device automatically during the boot process. This is convenient, but time consuming. So, rather than just sitting and staring at the screen, let digitized sounds or voice clips inform you when everything is loaded. One popular sound file to use for this is the voice of the HAL 9000 computer from *2001: A Space Odyssey.* When you hear HAL's voice, you know that your system is up and waiting for you.

You can also use a program called Raw (Q-Link filename: RAW V1.1, uploaded by Denton2) to play all of your RAW files sequentially. Unfortunately, this utility was uploaded in an unfinished form. It plays the sound files all right, but it includes no slick interface screens, no file selector box to pick a file to play, and not even a real icon, but at least it gives us digitized sound.

Digitized sound is great, but let's not forget all those wonderful music files out there. These files, usually referred to as SID files, often carry the file extension MUS. Some files even include words and artwork. Stereo SID files which utilize the extra SID chip are also plentiful.

You can play all those wonderful three-voice SIDs using geoSIDPlayer. This neat utility lets you choose SID music files from a standard file selector dialog box. It then plays a file for you while a little guy on the screen taps his foot and grins. GeoSIDPlayer is available in the Q-Link GEOS libraries. Its filename is GEOSIDPLAYER, and it was uploaded by RogerLU. Unfortunately, there is no stereo player for GEOS, but since most GEOS users have their cartridge port already filled with a RAM device of some kind, they wouldn't have room for a music cartridge anyway.

You know GEOS is geared toward graphics, but have you heard about its outstanding audio capabilities?

All these programs work fine, but I would love to see some more work done with sound programs for GEOS. I'd like to see the digitized sound player cleaned up and given a proper interface. I'd like a SID player for GEOS that displays the words if a WRD file is included. And that's not all. Someone on Q-Link a few weeks ago was talking about programming a SID player that would play in the background so you could listen to your favorite tunes while you're pounding the keys in geoWrite or mouse-hopping in geoPublish. Now that sounds like a dream GEOS program to me. I think I'd call it geoJukebox. ❐

PROGRAMMER'S PAGE

Randy Thompson

VECTORS, BOUNCERS, AND BASIC SAVERS

We have some more great tips from readers this month, so let's get to them.

Here are some readers' programs for adding vectors, bouncing screens, and protecting programs

Vector Addition

This program performs vector addition on two vectors and gives the resultant vector's magnitude and angle. The magnitudes and angles (between 0 and 360 degrees) of the vectors to be added are all that you enter. This can be a useful little program for physics students.

NILES NOONAN
TINLEY PARK, IL

```
XD 100 REM VECTOR FINDER
PJ 105 DIM M(3),A(3):QS="Y"
JM 110 X=0:Y=0
AC 120 DEF FN R(X)=(INT(X*1000
       +.5))/1000
KQ 130 FOR I=1 TO 2
QA 140 PRINT
AA 150 PRINT "MAGNITUDE OF VEC
       TOR";I;
MJ 160 INPUT M(I)
DQ 170 PRINT "ANGLE OF VECTOR"
       ;I;
SF 180 INPUT A(I)
BH 190 A(I)=A(I)*↑/180
GK 200 Y=M(I)*SIN(A(I))+Y
MF 210 X=M(I)*COS(A(I))+X
QD 220 NEXT I
XR 230 M(3)=FN R(SQR(X*X+Y*Y))
DP 240 A(3)=FN R((ATN(Y/X))*18
       0/↑)
EA 250 IF X<0 THEN A(3)=A(3)+1
       80
DA 260 IF A(3)<0 THEN A(3)=A(3
       )+360
PC 270 IF M(3)=0 THEN A(3)=0
HK 280 PRINT
AK 290 PRINT "MAGNITUDE OF RES
       ULTANT VECTOR =";M(3)
SK 300 PRINT "ANGLE OF RESULTA
       NT VECTOR =";A(3)
GM 310 PRINT
AA 320 PRINT "FIGURE ANOTHER";
BC 330 INPUT QS
HM 340 IF QS="Y" THEN 110
```

Screen Bouncer

Using a technique known as flexible line distance, the following program smoothly "bounces" the 64's screen down and up. Be sure to remove all cartridges from your computer before you run the program. After you load and run the program, type *SYS 49152* to set your screen in motion. Press Run/Stop–Restore to return your computer to a more stable state.

```
SE 5 D=90
KC 10 READ A:IFA=-1THEN40
PK 20 IFA>256THEN50
CF 30 B=B+A:POKE49152+C,A:C=C+
      1:GOTO10
MA 40 PRINT "ALL DONE! {RVS}SY
      S 49152{OFF} TO INSTALL.
      ":POKE16383,170:END
RP 50 D=D+10:IFB=ATHENB=0:GOTO
      10
JD 60 PRINT"{CLR}YOU TYPED LIN
      E"D"IN WRONG. RECHECK AN
      D{RVS}RUN{OFF} AGAIN!"
CK 70 PRINT "{2 DOWN}LIST"D"
      {3 UP}":POKE631,13:POKE
      {SPACE}198,1
AF 100 DATA 169,147,32,210,255
       ,120,162,1,142,26,208,2
       02,142,32,208,2056
KG 110 DATA 169,49,141,18,208,
       169,127,141,13,220,169,
       27,141,17,208,169,1986
SK 120 DATA 42,162,192,141,20,
       3,142,21,3,88,96,238,25
       ,208,238,112,192,1923
XK 130 DATA 173,112,192,16,11,
       41,127,141,111,192,169,
       128,56,237,111,192,170,
       2179
XE 140 DATA 208,2,162,1,172,18
       ,208,152,56,233,2,41,7,
       9,16,141,17,1445
HC 150 DATA 208,204,18,208,240
       ,251,200,202,208,236,17
       3,18,208,208,251,169,27
       ,3029
AJ 160 DATA 141,17,208,173,13,
       220,76,49,234,0,0,0,1,1
       132,-1
```

The secret to smoothly moving the 64's screen down and up is simple yet ingenious. This program installs a vertical-blank interrupt that temporarily keeps the computer's VIC chip (the chip responsible for the 64's video display) so busy that it won't have time to send any video information to your monitor. The longer the program occupies the VIC chip's time, the longer the screen's video output is delayed, and the lower the screen's graphics appear on your television or monitor. To get rid of the streaks the program leaves in the empty areas at the top of the screen, type *POKE 16838,0* while the program is running.

BOB BRODERICK
SAN RAMON, CA

Easy Program Protection

If you want to read-protect your BASIC programs (make them unloadable by BASIC), Richard Reano of San Diego, California, has two suggestions: Save your programs as sequential files, or, better yet, save them as user files.

When using the SAVE command, add a comma and the letter *S* after the filename to save a program as a sequential file, or add a comma and the letter *U* to save it as a user file.

SAVE "*filename*,S",8

SAVE "*filename*,U",8

Now, when you list the disk directory, you'll find that your PRG file has become a SEQ or USR file. And if you try to load the file, BASIC responds with a *FILE TYPE MISMATCH* error message.

Actually, there is a way to load these modified files, but you have to know the secret. To load one of these files, use the same *,S* or *,U* you used when you saved the program. For example, to load a BASIC program saved with SAVE "*filename*,S",8, use LOAD "*filename*,S",8.

Taking It With You

Henning Vahlenkamp from Matawan, New Jersey, provides this tip for 128 owners who do a lot of BASIC programming in 64 mode. To move from 128 mode to 64 mode without losing the current BASIC program, simply enter these two POKEs after executing the computer's GO 64 command.

POKE 43,1
POKE 44,28

These POKE statements tell the 64 portion of your computer that the current BASIC program is located in memory starting at 7169 ($1C01). That's the default location where BASIC programs are stored when your computer is in 128 mode. ❐

DATABASE

By Todd Piltingsrud

With DataBase you can store practically any type of information to disk and then retrieve or edit it as you like. DataBase has a powerful screen editor that operates like a conventional word processor, so it can be used for a variety of tasks.

DataBase consists of a BASIC program and a short machine language routine. To enter the BASIC program, use The Automatic Proofreader to help avoid typing errors. Look for Proofreader elsewhere in this section. Be sure to save a copy of the program before you run it.

Enter the machine language routine with MLX, our machine language entry program, which can be found elsewhere in this section. When MLX prompts, reply with the following addresses.

Starting address: C000
Ending address: C397

Be sure to save this program with the filename DATA.ML to the same disk that contains the BASIC portion. The BASIC program automatically searches for and loads that filename.

Using the Program

After loading and running DataBase, use the cursor keys and the Return key to move around on the menu screen and select the various options. The first time you run the program, you'll probably want to create an entry. Cursor to this option and press Return.

Note the difference between an entry and a file on the menu. A file is made up of several entries. For example, you could have numerous entries listing the names, addresses, and telephone numbers of your friends. Taken as a whole, these entries could then be saved as a file, perhaps with the filename FRIENDS.

When you create an entry, the screen clears, and the program goes to input mode. DataBase doesn't ask for a title for an entry. Instead, the first line of each entry acts as its title, but this line is still seen as part of the entry. Once you have entered the information you wish, press f7 to return to the menu. If you wish to create additional entries at this time, simply press Return with the cursor on the Create Entry option. After typing in several entries, you can press f1 or f3 to move up and down through the entries in the file.

After you have entered several entries, you can then save them under one filename. To do this, select the Save File option from the menu. You'll then be asked for a filename. Suppose we used FRIENDS as suggested earlier. This sequential file will then be saved to disk with all of the information entered so far.

From the DataBase menu, you can load a file back into memory, see a disk directory, scratch files, print files, and list or print all of the entries in a file. You can also recall, erase, or print individual entries within a larger file.

Once you have loaded a file and you want to recall a specific entry, select the Recall Entry option. You'll be asked for a name. Suppose you want the entry that contains Jack Johnson's information, simply type *J* or *JACK*. If you have several friends in the file whose names are Jack, simply enter the full name of the entry you want.

Entries are alphabetized by the first word on the line. Should you wish to add a new name to your FRIENDS file, load the file and select the Create Entry option to add new information. Just remember to save the file again when you have finished editing. You can use the same filename since DataBase lets you overwrite the old file.

Defaults

DataBase is set to handle up to 60 entries and 20 lines per entry. This default can be changed if you desire. Load DataBase, but before running it, list line 10. Notice that W equals the number of entries and H equals the number of lines per entry. By changing these values, you can decrease or increase the size of DataBase's memory. However, W can be no more than 255.

A warning is also in order here. The 64's memory has limits. Putting in numbers that are too high can lead to difficulties such as garbage collecting. This occurs when the 64 has to erase old memory to make room for new information. In an extreme case, you could run out of memory. Due to the 64's memory limitations, a practical limit for DataBase should be 50–100 entries and 15–20 lines per entry. This assumes that you probably won't fill each individual entry to its limit.

Printing

DataBase is also set so that the device number is 8 and the printer number is 4. These numbers can also be changed if you desire. Before running, list line 5. Here, D is the device number and P is the printer number. By changing these numbers, DataBase can be made to access other disk drives and printers.

If changes are made to these variables, be sure to save a copy of DataBase to avoid having to change them each time you load the program.

DATABASE

```
BM 0 REM COPYRIGHT 1993 -COMPU
     TE PUBLICATIONS INTL LTD
     {SPACE}- ALL RIGHTS RESER
     VED
GS 5 D=8:P=4:REM DEVICE AND PR
     INTER
SM 10 W=60:H=20:REM NUMBER OF
     {SPACE}ENTRIES AND NUMBE
     R OF LINES PER ENTRY
PX 15 POKE650,128:POKE53265,0:
     POKE53281,6:POKE53280,6
BJ 20 IFPEEK(49152)<>76THENLOA
     D"DATA.ML",D,1
EH 25 K=49152:DR=49155:IN=4915
     8:AL=49161:EE=49164:CM=4
     9167:BF=49170:LF=49173
QF 30 J=H+1:DIMAR$(W+1,H+1),T$
     (12)
AX 35 N$="":AR$(1,0)="":X=4:Y=
     5:T=1
EC 40 FORA=1TO12:READT$(A):NEX
     T
FK 45 POKE198,0:N$="":PRINT"
     {CLR}{DOWN}{CYN}"CHR$(14
     )TAB(15)"DATABASE{DOWN}"
CQ 50 PRINTTAB(4)"{A}*********
     **********{S}
     "
SX 55 FORA=1TO6:PRINTTAB(4)"
     {CYN}-{7}"T$(A)TAB(23)T$
     (A+6)TAB(35)"{CYN}-":NEX
     T
JS 60 PRINTTAB(4)"{CYN}{Z}****
     **********
     **{X}":POKE53265,27:GOTO
     100
SJ 65 GETA$:IFA$=""THEN65
BQ 70 IFA$=CHR$(13)THENPOKE781
     ,12:POKE782,0:POKE783,0:
     SYS65520:PRINT"{7}";:GOT
     O110
AB 75 PRINTTAB(Y)"{7}"T$(T)
KK 80 IFA$="{UP}"ANDX>4THENX=X
     -1:T=T-1
BB 85 IFA$="{DOWN}"ANDX<9THENX
     =X+1:T=T+1
```

```
MM 90 IFA$="{LEFT}"ANDY=23THEN
      Y=5:T=T-6
MA 95 IFA$="{RIGHT}"ANDY=5THEN
      Y=23:T=T+6
HK 100 POKE781,X:POKE782,Y:POK
      E783,0:SYS65520:PRINTTA
      B(Y)"{WHT}"T$(T)"{UP}":
      GOTO65
MP 105 PRINT"{CLR}";:END
RR 110 ONTGOTO125,175,565,210,
      620,650,730,760,590,635
      ,160,105
BX 115 GOTO65
EJ 120 REM LOAD FILE
SM 125 NN$="":INPUT"FILENAME";
      NN$:IFNN$=""THEN45
EA 130 SYSCM:OPEN1,D,15:OPEN8,
      D,8,NN$+",S,R":INPUT#1,
      A,B$,B,C:IFA<>0THEN710
QH 135 FORA=1TOW+1:SYSIN:AR$(A
      ,0)=A$:IFLEN(A$)=0THENC
      LOSE1:CLOSE8:GOTO45
KJ 140 FORB=1TOJ:SYSIN:AR$(A,B
      )=A$:IFLEN(A$)=0ANDST=0
      THENNEXTA:GOTO810
EE 145 IFST=0THENNEXTB:NEXTA:G
      OTO810
EQ 150 AR$(A+1,0)="":CLOSE1:CL
      OSE8:GOTO45
SR 155 REM CLEAR MEMORY
SR 160 PRINT"ARE YOU SURE? Y/N
      ":WAIT198,1:IFPEEK(631)
      =89THENRUN
MC 165 GOTO45
BH 170 REM RECALL
PS 175 INPUT"NAME";N$:IFN$=""T
      HEN45
DM 180 IFRIGHT$(N$,1)="*"THENN
      $=LEFT$(N$,LEN(N$)-1)
PE 185 FORA=1TOW:IFAR$(A,0)=""
      THENN$="":GOTO800
GC 190 IFLEFT$(AR$(A,0),LEN(N$
      ))<>N$THENNEXT:GOTO800
BQ 195 PRINT"{CLR}"AR$(A,0);:F
      ORB=1TOH:IFB<25THENPRIN
      TCHR$(13)AR$(A,B);:NEXT
DA 200 GOTO215
FH 205 REM CREATE ENTRY
PE 210 PRINT"{CLR}";:FORA=1TOW
      :IFAR$(A,0)<>""THENNEXT
      :GOTO810:REM FIND END O
      F FILE
EM 215 PRINT"{HOME}";:B=0:SX=0
CS 220 SYSK:GOSUB485
DR 225 ONPEEK(2)GOTO235,510,26
      5,285,310,325,335,350,4
      00,285,445,465,470,510
HG 230 REM LEFT
SJ 235 IFCX<>0THEN510
BR 240 IFB=0THEN220
SP 245 GOSUB485:SYSLF:AR$(A,B)
      =N$
BK 250 IFB=SXTHENSX=SX-1:B=B-1
      :GOSUB495:PRINTA$A$;:GO
      TO220
GD 255 B=B-1:GOSUB500:PRINTA$A
      $;:GOTO220
XH 260 REM UP
FS 265 IFB=0THEN220
GD 270 GOSUB485:SYSLF:AR$(A,B)
      =N$:IFB=SXTHENSX=SX-1:B
      =B-1:GOSUB495:PRINTA$;:
      GOTO220
KC 275 B=B-1:GOSUB500:PRINTA$;
      :GOTO220
SX 280 REM DOWN, SHIFTED RETUR
      N
SQ 285 IFB=HTHEN220
BC 290 SYSLF:AR$(A,B)=N$:GOSUB
      500
PJ 295 IFCY=24THENSX=SX+1:B=B+
      1:PRINTCHR$(13)AR$(A,B)
      ;:GOSUB500:GOTO220
MD 300 B=B+1:GOSUB500:PRINTA$;
      :GOTO220
HS 305 REM CLR/HOME (GO TO BOT
      TOM)
CX 310 SYSLF:AR$(A,B)=N$:FORB=
      0TOJ:IFAR$(A,B+1)<>""TH
      ENNEXT
AE 315 SX=B:GOSUB495:PRINT"
      {HOME}";:GOTO220
RP 320 REM HOME
XC 325 SYSLF:AR$(A,B)=N$:B=0:S
      X=B:GOSUB495:PRINTA$;:G
      OTO220
QH 330 REM INSERT
QD 335 GOSUB485:SYSLF:AR$(A,B)
      =N$:GOSUB500:IFLEN(AR$(
      A,B))=39THEN220
EP 340 GOTO515
PC 345 REM DELETE
HH 350 FL=1:IFCX<>0THEN510
XE 355 IFB=0THEN220
FH 360 IFB=SXTHENSX=SX-1:PRINT
      "{DOWN}";:GOSUB485:GOSU
      B495
DJ 365 SYSLF:AR$(A,B)=N$:IFLEN
      (AR$(A,B-1))=39THENAR$(
      A,B-1)=LEFT$(AR$(A,B-1)
      ,38)
DJ 370 A$=LEFT$(AR$(A,B),39-LE
      N(AR$(A,B-1)))
DB 375 AR$(A,B)=RIGHT$(AR$(A,B
      ),LEN(AR$(A,B))-LEN(A$)
      )
EG 380 IFAR$(A,B)=""THENFORU=B
      TOH:AR$(A,U)=AR$(A,U+1)
      :NEXT
FE 385 B=B-1:CY=CY-1:GOSUB500:
      PRINTAR$(A,B);:GOSUB485
      :PRINTA$;:SYSLF:AR$(A,B
      )=N$
DQ 390 GOSUB495:GOTO220
BA 395 REM RETURN
KD 400 IFB=HTHEN220
CG 405 FL=1:IFAR$(A,H)<>""THEN
      290
AS 410 IFCY=24THENSX=SX+1
FB 415 GOSUB485:SYSLF:AR$(A,B)
      =N$
XB 420 FORU=HTOB+1STEP-1:AR$(A
      ,U)=AR$(A,U-1):NEXT:REM
       INSERT
FC 425 B=B+1:GOSUB500:SYSBF:AR
      $(A,B)=N$
AX 430 AR$(A,B-1)=LEFT$(AR$(A,
      B-1),LEN(AR$(A,B-1))-LE
      N(AR$(A,B)))
DK 435 PRINT:GOSUB485:GOSUB495
      :GOTO220
XQ 440 REM F1
CP 445 IFA=1THEN220
FP 450 IFFL=0THEN545
JF 455 FL=0:SYSLF:AR$(A,B)=N$:
      GOTO530
JF 460 REM F3 AND F7
FB 465 IFAR$(A+1,0)=""THEN220
RJ 470 IFFL=0THEN545
AG 475 FL=0:SYSLF:AR$(A,B)=N$:
      GOTO530
XE 480 REM SAVE CURSOR LOCATIO
      N
MP 485 POKE783,1:SYS65520:CX=P
      EEK(782):CY=PEEK(781):R
      ETURN
XE 490 REM REDRAW SCREEN
SG 495 POKE212,0:PRINT"{CLR}"A
      R$(A,SX);
SG 496 FORU=SX+1TOSX+24:IFU<>J
      THENPRINTCHR$(13)AR$(A,
      U);:NEXT
XB 500 POKE783,0:POKE782,CX:PO
      KE781,CY:SYS65520:RETUR
      N
CG 505 REM PRINT TO SCREEN
AP 510 FL=1:IFCX=38ANDB=HTHENP
      RINTA$"{LEFT}";:GOTO220
QQ 515 PRINTA$;:GOSUB485:IFCX=
      39THENSYSLF:AR$(A,B)=N$
      :PRINT:B=B+1
EC 520 GOTO220
JG 525 REM ALPHABETIZE IT
XB 530 B=0:FORU=0TOH:IFAR$(A,U
      )=""THENNEXT:GOTO540
AJ 535 N$=AR$(A,U):AR$(A,U)=""
      :AR$(A,B)=N$:B=B+1:NEXT
HG 540 SYSAL
RA 545 IFA$="{F1}"ANDA<>1THENA
      =A-1:GOTO195
HE 550 IFA$="{F3}"ANDAR$(A+1,0
      )<>""THENA=A+1:GOTO195
DM 555 GOTO45
HX 560 REM LIST ENTRIES
AC 565 FORA=1TOW:IFAR$(A,0)=""
      THEN815
HP 570 PRINT:FORB=0TOH:IFAR$(A
      ,B)<>""THENPRINTAR$(A,B
      ):NEXTB
AA 575 IFPEEK(203)<>64THEN575
AM 580 NEXTA:GOTO810
SD 585 REM ERASE ENTRY
RE 590 INPUT"NAME";N$:IFN$=""T
      HEN45
BX 595 IFRIGHT$(N$,1)="*"THENN
      $=LEFT$(N$,LEN(N$)-1)
QR 600 FORA=1TOW+1:IFAR$(A,0)=
      ""THENN$="":GOTO800
MJ 605 IFLEFT$(AR$(A,0),LEN(N$
      ))<>N$THENNEXT:GOTO800
FG 610 AR$(A,0)="":SYSEE:GOTO4
```

```
      5
MG 615 REM DIRECTORY
KF 620 POKE186,D:SYSDR:PRINT:G
       OTO815
DJ 625 IFB=0THEN810
XK 630 REM SCRATCH FILE
SX 635 INPUT"FILENAME";N$:IFN$
       =""THEN45
HM 640 OPEN1,D,15,"S0:"+N$:CLO
       SE1:GOTO45
GG 645 REM SAVE FILE
FQ 650 CLOSE1:CLOSE8:NN$="":PO
       KE198,0:REM NO REPLACE
DP 655 IFRIGHT$(NN$,1)="*"THEN
       NN$=""
RM 660 IFNN$=""THENINPUT"FILEN
       AME";NN$:IFNN$=""THEN45
GJ 665 OPEN1,D,15:OPEN8,D,8,""
       +NN$+",S,W":INPUT#1,A,B
       $,B,C
XP 670 IFA=63THENCLOSE8:PRINT"
       REPLACE "NN$"? Y/N":WAI
       T198,1:IFPEEK(631)<>89T
       HEN650
PJ 675 IFA=63THENOPEN8,D,8,"@0
       :"+NN$+",S,W":INPUT#1,A
       ,B$,B,C
SP 680 IFA<>0THEN710
JX 685 FORA=1TOW+1:PRINT#8,AR$
       (A,0):IFAR$(A,0)=""THEN
       CLOSE1:CLOSE8:GOTO45
GD 690 FORB=1TOJ:PRINT#8,AR$(A
       ,B):IFAR$(A,B)<>""THENN
       EXTB
XX 695 NEXTA
XH 700 CLOSE1:CLOSE8:GOTO45
MB 705 REM DRIVE STATUS
JP 710 PRINTA;B$;B;C:CLOSE1:CL
       OSE8:GOTO815
KD 715 REM QUIT
KC 720 PRINT"{CLR}";:END
CJ 725 REM PRINT FILE
DG 730 PRINT"PRESS RETURN TO C
       ANCEL"
GX 735 OPEN1,P,7:FORA=1TOW:IFA
       R$(A,0)=""THEN750
CH 740 PRINT#1:FORB=0TOH:IFAR$
       (A,B)<>""THENPRINT#1,AR
       $(A,B):NEXTB
JG 745 GETA$:IFA$<>CHR$(13)THE
       NNEXTA
FD 750 CLOSE1:GOTO815
XS 755 REM PRINT ENTRY
DM 760 INPUT"NAME";N$:IFN$=""T
       HEN45
XE 765 IFRIGHT$(N$,1)="*"THENN
       $=LEFT$(N$,LEN(N$)-1)
DD 770 FORA=1TOW:IFAR$(A,0)=""
       THENN$="":GOTO800
MX 775 IFLEFT$(AR$(A,0),LEN(N$
       ))<>N$THENNEXTA:GOTO800
EM 780 PRINT"PRESS RETURN TO C
       ANCEL"
BP 785 OPEN1,P,7:PRINT#1:FORB=
       0TOH:IFAR$(A,B)<>""THEN
       PRINT#1,AR$(A,B)
JG 790 GETA$:IFA$<>CHR$(13)THE
       NNEXT
KE 795 CLOSE1:GOTO815
FD 800 PRINT"NOT FOUND, ":GOTO
       815
SF 805 CLOSE1:CLOSE8:PRINT"FIL
       E NOT COMPATIBLE, ":AR$
       (1,0)="":NN$="":GOTO815
KM 810 PRINT"FULL FILE, ";
HB 815 POKE198,0:PRINT"{WHT}PR
       ESS ANY KEY":WAIT198,1:
       GOTO45
BQ 820 DATA LOAD FILE,RECALL E
       NTRY,LIST FILE,CREATE E
       NTRY,DIRECTORY,SAVE FIL
       E
SS 825 DATA PRINT FILE,PRINT E
       NTRY,ERASE ENTRY,SCRATC
       H FILE,CLEAR MEMORY,QUI
       T
```

DATA.ML

```
C000:4C A5 C0 4C 6D C1 4C 33 2C
C008:C1 4C CC C1 4C D6 C2 4C C2
C010:A2 C2 4C 1F C0 38 20 F0 27
C018:FF 18 A0 00 20 F0 FF 20 98
C020:88 C0 84 02 A0 26 A9 20 D7
C028:D1 05 D0 05 88 C4 02 10 A9
C030:F7 18 A5 02 65 05 85 05 D7
C038:A9 00 65 06 85 06 38 C8 19
C040:98 E5 02 85 02 20 F4 B4 4F
C048:A6 05 A4 06 20 88 B6 A2 86
C050:02 20 5B C1 A5 02 F0 2F A8
C058:A0 00 84 06 B1 33 85 05 85
C060:29 3F 06 05 24 05 10 02 AE
C068:09 80 90 04 A6 06 D0 04 D3
C070:70 02 09 40 C9 22 D0 08 50
C078:A5 06 49 01 85 06 A9 22 41
C080:91 33 C8 C4 02 D0 D5 60 5C
C088:38 20 F0 FF 8A 85 05 0A CA
C090:0A 65 05 85 05 A9 00 06 3E
C098:05 2A 06 05 2A 06 05 2A D5
C0A0:69 04 85 06 60 A2 00 20 96
C0A8:08 C1 B1 03 D0 11 A9 01 24
C0B0:20 F4 B4 A0 04 A5 34 91 D0
C0B8:03 88 A5 33 91 03 88 A9 19
C0C0:01 91 03 C8 B1 03 AA C8 CB
C0C8:B1 03 85 04 86 03 20 88 DD
C0D0:C0 B1 05 09 80 91 05 A2 47
C0D8:00 86 CC 86 D4 86 D8 20 90
C0E0:E4 FF F0 FB 48 20 88 C0 47
C0E8:A2 02 86 CD B1 05 30 FC E8
C0F0:86 CC 29 7F 91 05 68 A0 18
C0F8:00 91 03 C8 C0 0E F0 05 F0
C100:D9 84 C3 D0 F6 84 02 60 45
C108:A5 2D 85 03 A5 2E 85 04 7F
C110:A0 00 B1 03 DD 81 C3 F0 B7
C118:10 18 A9 07 65 03 85 03 94
C120:A9 00 65 04 85 04 4C 10 4A
C128:C1 C8 B1 03 DD 82 C3 D0 76
C130:E8 C8 60 A2 08 20 C6 FF DE
C138:A0 00 20 CF FF 99 00 02 75
C140:C9 0D F0 05 C8 C0 28 D0 C4
C148:F1 20 CC FF 98 85 02 20 65
C150:F4 B4 A2 00 A0 02 20 88 A5
C158:B6 A2 00 20 08 C1 A5 02 76
C160:91 03 C8 A5 33 91 03 C8 8F
C168:A5 34 91 03 60 A5 BA AA E7
C170:A0 00 20 BA FF A9 02 A2 41
C178:7F A0 C3 20 BD FF 20 C0 4D
C180:FF A6 BA 20 C6 FF A9 0D 9D
C188:20 D2 FF A0 04 20 A5 FF C6
C190:88 10 FA 48 20 A5 FF A8 80
C198:68 AA 98 A4 90 D0 20 A0 01
C1A0:06 84 D3 20 CD BD E6 D3 CB
C1A8:20 A5 FF 20 D2 FF D0 F8 D8
C1B0:A9 0D 20 D2 FF A5 C5 C9 69
C1B8:40 D0 FA A0 02 D0 CE A5 90
C1C0:BA 20 C3 FF 20 CC FF A9 FF
C1C8:00 85 C6 60 20 D6 C2 A0 0F
C1D0:08 B1 2F A8 88 88 84 FD A2
C1D8:18 A9 09 65 2F 85 FB A9 7B
C1E0:00 65 30 85 FC A5 FD 85 1C
C1E8:71 A9 00 85 FF 18 A9 03 9E
C1F0:65 FB 85 FB 85 03 A9 00 22
C1F8:65 FC 85 FC 85 04 A0 00 6C
C200:B1 03 F0 3E A0 03 D1 03 D8
C208:90 04 B1 03 F0 34 85 02 A2
C210:C8 B1 03 85 05 C8 B1 03 D0
C218:85 06 A0 02 B1 03 AA 88 8D
C220:B1 03 85 03 86 04 88 B1 27
C228:03 D1 05 90 11 D0 1C C8 1A
C230:C4 02 D0 F3 A0 03 B1 FB 62
C238:A0 00 D1 FB 90 0D C6 71 BF
C240:D0 AB A5 FF F0 04 C6 FD F0
C248:D0 8E 60 A2 00 A0 08 84 27
C250:FF B1 2F 85 9E 86 9F 0A D8
C258:26 9F 65 9E 85 9E 90 02 39
C260:E6 9F A0 06 B1 2F A8 88 D9
C268:84 72 A5 FB 85 03 A5 FC C1
C270:85 04 18 A9 03 65 03 85 90
C278:05 A9 00 65 04 85 06 A0 24
C280:02 B1 03 AA B1 05 91 03 46
C288:8A 91 05 88 10 F3 18 A5 07
C290:9E 65 03 85 03 A5 9F 65 CA
C298:04 85 04 C6 72 D0 D4 4C 3B
C2A0:3E C2 18 A9 09 65 2F 85 55
C2A8:03 A9 00 65 30 85 04 A0 B0
C2B0:06 B1 2F 85 71 A0 08 B1 B3
C2B8:2F 85 72 A0 00 98 91 03 18
C2C0:18 A9 03 65 03 85 03 A9 51
C2C8:00 65 04 85 04 C6 72 D0 71
C2D0:EC C6 71 D0 E0 60 A2 00 87
C2D8:A0 08 B1 2F A8 85 9E 86 F8
C2E0:9F 0A 26 9F 65 9E 85 9E C6
C2E8:90 02 E6 9F 88 84 02 18 80
C2F0:A9 0C 65 2F 85 03 A9 00 79
C2F8:65 30 85 04 A0 00 B1 03 99
C300:F0 12 18 A9 03 65 03 85 5B
C308:03 A9 00 65 04 85 04 C6 D6
C310:02 D0 EB 60 C6 02 F0 4A BA
C318:A5 03 85 FB A5 04 85 FC E8
C320:A0 06 B1 2F 85 71 18 A9 6E
C328:03 65 03 85 05 A9 00 65 77
C330:04 85 06 A0 02 B1 05 91 58
C338:03 88 10 F9 18 A5 9E 65 FE
C340:03 85 03 A5 9F 65 04 85 85
C348:04 C6 71 D0 D9 18 A9 03 44
C350:65 FB 85 FB 85 03 A9 00 85
C358:65 FC 85 FC 85 04 C6 02 1E
C360:D0 BE A0 06 B1 2F 85 02 CB
C368:A0 00 98 91 FB 18 A5 9E 96
C370:65 FB 85 FB A5 9F 65 FC 8D
C378:85 FC C6 02 D0 EA 60 24 12
C380:30 41 80 4E 80 9D 1D 91 AB
C388:11 93 13 94 14 0D 8D 85 9E
C390:86 88 00 00 00 00 00 00 7D
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BRICK LAYER

By Maurice Yanney

You're the mason who has to repair holes in a brick wall. To make matters more interesting, each hole requires a brick of a certain color. For an additional twist, the wall you have to repair is moving, and the bricks you need are scattered about a maze. How many mazes can you complete in this arcade-style game for the 64?

Typing It In

Brick Layer is written entirely in machine language, but it loads and runs like a BASIC program. To type it in, use MLX, our machine language entry program, which you'll find elsewhere in this section. When MLX prompts, you respond with the following values.

Starting address: 0801
Ending address: 1990

Be sure to save a copy of the program before exiting MLX.

Playing the Game

The object of this game is to fill all of the holes which appear in the wall at the bottom of the screen. The holes are filled by dropping in a brick that has the same color as the area around the hole. Use a joystick in port 2 to move your tank around the various mazes.

I didn't mention the tank? This game has an element of danger as well. Press the fire button to have the tank fire bullets, pick up a brick, or drop a brick.

When your tank is directly over a desired brick, press the fire button to pick it up. You can carry only one brick at a time. When you're carrying a brick, press the fire button again to drop it (unless all of the spaces currently under the tank contain bricks). If your tank isn't carrying a brick and there isn't one immediately beneath it, pressing the fire button will shoot bullets in all directions.

Obstacles

You need the bullets to make the three electric wheelbarrows drop their bricks. Each wheelbarrow is a different color, and each moves about the maze. The wheelbarrows carry bricks that are the same color as the wheelbarrow. When a wheelbarrow carrying a brick is hit by a bullet, it drops a brick. You want to pick up the dropped brick before the wheelbarrow can retrieve it.

When a wheelbarrow is empty, it moves faster than it does when it is filled. A wheelbarrow can pick up a brick by moving over a brick of the same color or by getting a new one at the maze entrance at the top center of the screen. Wheelbarrows will no longer move to the entrance for new bricks when all bricks of the same color as the wheelbarrow have been brought out onto the maze.

If a wheelbarrow touches any part of the tank, the tank becomes electrified and is destroyed. There are four extra tanks; when all your tanks are destroyed, the game is over. Pressing the fire button will start a new game.

When you pick up a brick, your speed will be reduced, but you want to take it to the bottom of the screen and drop it directly over the hole with the appropriate color. When all the holes are filled, a new maze appears, and you earn a bonus player.

To pause the game, hold down the Shift key or press the Shift Lock key. To continue playing, release the Shift or Shift Lock key.

BRICK LAYER

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0801:0B 08 70 17 9E 32 34 30 6E
0809:37 00 00 00 20 20 20 20 96
0811:20 20 20 20 20 A0 C4 B9 06
0819:3C 08 99 F8 00 B9 FD 08 F6
0821:99 33 03 88 D0 F1 A0 09 4C
0829:B9 0C 08 99 FF 03 88 D0 A1
0831:F7 A9 7E 85 2D A9 1E 85 A1
0839:2E 4C 00 01 12 EA 00 7E 3E
0841:1E 07 18 B9 6E 09 99 E8 74
0849:07 C8 D0 F7 EE 02 01 EE 19
0851:05 01 C6 F9 D0 ED A2 03 23
0859:20 34 03 F0 33 C9 07 D0 95
0861:16 A2 01 20 34 03 D0 0A A0
0869:A2 04 20 34 03 18 69 07 65
0871:10 05 A2 0A 20 34 03 85 1D
0879:A8 A5 A7 85 A9 A5 FE 85 FB
0881:F7 A5 FF 85 F8 20 6C 03 73
0889:A5 F8 85 FF A5 F7 85 FE 72
0891:E8 20 34 03 D0 1E A2 08 21
0899:20 34 03 A0 02 84 A8 85 2A
08A1:A6 18 A5 FC 65 A6 85 F7 58
08A9:A5 FD 65 A7 85 F8 20 6C EF
08B1:03 4C 13 01 E8 20 34 03 FB
08B9:D0 1C A0 03 84 A8 E8 20 36
08C1:34 03 F0 08 A2 08 20 34 F4
08C9:03 4C 5C 01 A2 0C 20 34 C3
08D1:03 E6 A7 4C 5C 01 E8 20 AF
08D9:34 03 D0 0A E8 20 34 03 B2
08E1:18 69 04 A8 D0 D6 E8 20 37
08E9:34 03 D0 0A A2 02 20 34 21
08F1:03 18 69 06 D0 ED A2 08 A2
08F9:20 34 03 D0 E6 A9 00 85 F7
0901:A7 A4 FB F0 0C 06 FA 2A 37
0909:26 A7 C6 FB CA D0 F2 A8 D8
0911:60 48 B1 FE 85 FA A9 08 FE
0919:85 FB 68 A4 FE D0 02 C6 4A
0921:FF C6 FE C0 E7 D0 DE A4 B5
0929:FF C0 07 D0 D8 A9 37 85 BA
0931:01 58 4C 0E 08 A4 A8 F0 59
0939:22 A5 F7 38 E5 A8 B0 03 7E
0941:C6 F8 38 85 F7 A5 FC E5 8A
0949:A8 B0 02 C6 FD 85 FC B1 3A
0951:F7 88 91 FC 98 D0 F8 C4 42
0959:A9 F0 0A B1 F7 C6 FD C6 76
0961:F8 C6 A9 10 EC 60 78 E6 98
0969:01 4C 16 08 60 00 0C 08 75
0971:0A 00 9E 20 32 30 36 32 4F
0979:00 00 00 E7 37 21 D0 8D 77
0981:20 40 7A 38 08 19 20 37 A2
0989:69 91 F6 1A A2 8F A0 1D E6
0991:20 17 0D 11 0F CD 79 14 E2
0999:A9 1F C4 0E 8D F7 20 49 97
09A1:A0 22 01 14 DC AD 8D 02 A8
09A9:3A B8 06 1D E2 C1 28 84 8C
09B1:83 F0 0B CE 4E 00 0E E2 81
09B9:A3 51 B9 90 AC C3 B1 F1 FB
09C1:84 A6 20 F8 9D 00 22 03 87
09C9:20 F0 17 20 A4 0D 20 50 F6
09D1:16 20 96 15 B9 39 E2 9A 2E
09D9:E0 FC 01 A1 20 C1 0E 20 1A
09E1:4D 12 50 33 02 C8 10 EC 9C
09E9:4B 10 40 DE A5 1E E8 E0 F3
09F1:03 D0 F3 AD A9 1E F0 2F E9
09F9:1F 73 91 02 53 09 8E C0 67
0A01:20 24 8D 89 0E F0 14 20 F4
0A09:E3 1A AD B5 60 38 38 A6 A1
0A11:0A 20 B4 0C AD 1E D0 E1 F2
0A19:F0 82 EE 06 1B 0A 20 02 C7
0A21:0C 4C 43 08 EA 46 28 84 7C
0A29:C6 69 9D C6 0C 8B 2C 1C 1E
0A31:12 85 22 27 63 1D 4C 20 AE
0A39:09 20 26 09 0E 9E 0A AB D9
0A41:68 08 A0 03 5F C3 C6 08 6F
0A49:62 50 19 71 59 72 A8 01 C3
0A51:CA C1 ED A0 02 DE 61 E5 37
0A59:E9 88 18 A9 06 E5 04 18 0A
0A61:48 8E 71 05 44 AE C1 B1 CD
0A69:0C 20 0C 86 0D 03 70 9F 6A
0A71:32 4A 4A 4A 66 31 10 15 4C
0A79:18 69 55 45 A5 FB 56 28 E4
0A81:85 FB 83 19 E9 08 03 1C EA
0A89:A5 FC 38 E9 D4 A8 A0 00 DF
0A91:85 A2 85 A1 85 A0 60 E2 2E
0A99:70 84 2C 06 61 A3 05 01 91
0AA1:90 FA 4C 88 09 A2 08 5E 10
0AA9:1F 9D FF D3 9C 88 10 5F 78
0AB1:19 01 83 03 D0 15 A9 16 77
0AB9:7B 91 41 A2 0F A0 F0 AB CA
0AC1:95 0B A3 A9 33 4C D5 61 4A
0AC9:C3 46 11 A2 F5 A0 EF BC 6C
0AD1:0D 90 39 0D 21 39 0D C5 56
0AD9:46 46 43 87 3C 3A 73 94 C9
0AE1:00 C1 13 A2 F0 A0 0F D2 ED
0AE9:B2 14 91 08 87 0C 54 FF 24
0AF1:38 ED 98 06 10 11 AA A8 D3
0AF9:A9 13 20 3A A9 04 41 21 50
0B01:19 8D 01 7B 11 81 A2 FF B2
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0B09:A0 FF 4C 35 C0 15 04 D4 83
0B11:8E 05 D4 8C 06 D4 A9 0A F3
0B19:8C 4F 14 6D 18 D4 49 11 5A
0B21:0A 94 8E B4 80 08 B5 88 96
0B29:B9 1E A0 04 2D A2 02 D1 C1
0B31:B9 BA B3 90 28 B3 10 CA 4D
0B39:CF 42 75 CE 42 D2 3C 0B 44
0B41:DA A0 1B 79 0B 19 10 A2 67
0B49:2B 59 15 41 09 A9 10 A5 B6
0B51:54 A9 82 50 53 41 D0 B4 47
0B59:A2 88 A0 1C 4C 17 0D 06 97
0B61:57 0B C2 A5 C0 2B 3E 8A 52
0B69:84 F0 F9 20 88 4C 41 C8 FF
0B71:61 39 36 2D 08 A5 A2 C9 06
0B79:16 90 ED EE 2A FE A8 86 90
0B81:4C 78 C0 E4 53 90 20 F3 53
0B89:0A 4C B8 0A 8D 02 08 8C 80
0B91:63 55 A0 1E 4C 1E AB A0 77
0B99:15 A9 20 99 C7 07 68 73 E0
0BA1:43 FA 60 F2 06 A2 AC 29 90
0BA9:1E 13 00 83 53 D4 D8 E1 4D
0BB1:49 32 8D 02 8E 98 8D 04 C0
0BB9:C0 08 FF 8D 06 8C 00 7C E9
0BC1:10 D0 A9 1A D0 77 88 A6 07
0BC9:C1 03 11 05 10 18 A8 00 26
0BD1:47 20 3C 2A 90 12 C9 DA F8
0BD9:B0 0E 38 E9 2A 29 07 C9 3F
0BE1:07 F2 79 E6 06 20 1C 1B D9
0BE9:20 11 0A 11 FC 51 08 77 5B
0BF1:C3 FF 90 CB B3 01 1D D0 65
0BF9:8D 17 D0 AD 9A 00 82 83 EE
0C01:15 D0 60 A0 28 A9 FE E0 B4
0C09:F2 A9 0F 49 CD 27 88 C3 5B
0C11:03 2C 40 09 2C 75 A8 14 EA
0C19:1A F1 A2 05 D2 A8 54 78 B9
0C21:A0 54 29 D0 E9 F8 A1 03 4A
0C29:08 4A 1D 27 80 F3 21 27 2B
0C31:03 CD C9 1D 26 77 B8 EB B5
0C39:60 D3 A9 FF 03 41 07 08 DE
0C41:44 71 F4 D1 44 A2 04 90 D8
0C49:94 9D 70 DB E8 E8 E8 D0 6C
0C51:6C 80 02 A0 02 E0 28 1B 09
0C59:56 20 D0 1A EE 24 46 20 15
0C61:8D E6 07 59 06 25 4C 19 E6
0C69:60 6C 64 90 05 E4 D9 1C ED
0C71:41 00 BD 45 34 20 CD BD B1
0C79:20 BC 1A A9 00 DF F8 1A 3A
0C81:A4 95 05 90 02 3C B2 23 84
0C89:CA AA CA BD 46 50 AB 40 F1
0C91:04 AC A4 AD 40 0A 4B A4 AB
0C99:A9 1E BD 50 00 05 00 20 FE
0CA1:20 75 0B AD B4 75 85 06 EF
0CA9:90 06 38 E9 05 4C 60 84 CF
0CB1:27 00 0E 24 60 48 C2 C6 D1
0CB9:B1 6C E2 24 6C 14 43 78 17
0CC1:82 24 64 28 03 06 20 84 28
0CC9:0A 4C 95 0C 20 90 C5 05 41
0CD1:FE 0A A8 AE C0 1E 68 82 BD
0CD9:BA 24 14 E0 85 0B C9 0B DF
0CE1:05 B2 0B 4C DB 0B DC C9 DD
0CE9:A2 20 D8 0F C0 32 0F C9 1E
0CF1:04 F0 0B 72 33 A2 03 20 1B
0CF9:9A 09 CA D0 FA 20 08 0A 7A
0D01:EE 5A 2E AD 20 35 1F CA A8
0D09:A8 0E 35 B5 AD C6 C4 8D 9C
0D11:CA AD AA C4 8D CA AD AA 3B
0D19:C4 8D CA 2A 94 8E C8 14 79
0D21:B4 C4 3B D3 52 07 E0 06 E1
0D29:0E 79 15 7E 19 20 A3 09 CC
0D31:4C 91 09 20 E2 19 C9 81 89
0D39:0E 8C A7 8C AA 1E 8C 09 2B
0D41:D0 A9 58 9D 8A CB 38 1A 21
0D49:9D 01 35 0B 9D 99 D6 A5 70
0D51:1E 01 19 0D 91 03 0E E8 4C
0D59:38 84 DF 3B 85 9F 4D E4 8A
0D61:8C 08 EA 14 20 FC 14 A0 20
0D69:27 A9 A0 8D E7 20 17 98 F4
0D71:07 99 00 04 D0 01 C3 F5 BD
0D79:A9 66 8D 13 15 14 10 47 45
0D81:15 04 A2 73 00 10 87 6A 6C
0D89:1D 87 A2 18 AD 03 18 20 B3
0D91:0A E5 A9 74 A0 1E 20 1E 82
0D99:AB E4 C7 8D B6 40 15 85 FA
0DA1:48 B7 81 6C 87 8A B8 1E BA
0DA9:60 8C FD 0E 8E 4E BC D1 B0
0DB1:F0 07 AD 94 89 5B 70 0E AD
0DB9:CE 03 FE 22 D0 82 21 51 22
0DC1:C0 0E DB 3C FF 84 41 8D 21
0DC9:21 14 F0 0D 20 3B 75 5A 9B
0DD1:08 A9 08 58 C6 86 01 4F 82
0DD9:46 08 93 31 04 4F C6 86 10
0DE1:02 4F 46 CF 93 31 02 4F 4B
0DE9:46 1C 85 C9 03 F0 F1 CD 09
0DF1:91 11 50 DC 11 04 60 64 AE
0DF9:84 EE 83 08 AD 96 D0 67 D3
0E01:A1 18 1B 34 29 C5 4A 1D AC
0E09:34 73 F4 C4 61 20 20 10 E2
0E11:D4 29 0B 97 0E 31 C9 40 C5
0E19:50 0F 71 D0 04 C6 03 20 BD
0E21:C9 80 D1 43 1C 15 81 51 3A
0E29:93 C9 C0 B0 0C E9 0E 74 3D
0E31:78 64 4C 03 1D 0B 19 7A 1E
0E39:A0 91 33 8A CD 38 06 01 75
0E41:62 F9 10 50 7D 03 03 4C 5E
0E49:B0 10 4C DC 10 C1 0F 8B 4A
0E51:87 42 AD 55 06 E1 A1 28 EF
0E59:AD 15 02 38 CE 90 3C AD 34
0E61:C9 03 6B 5A 4C 9B 56 20 D3
0E69:A1 11 EE 9D 90 D1 F0 68 68
0E71:D8 27 69 C8 27 B0 15 6B 0F
0E79:88 19 C7 AB A8 1D 07 C8 64
0E81:6A B5 FD D0 0B C3 05 A1 20
0E89:1E B8 20 8C 8C 79 A9 1C 69
0E91:A0 4D C0 A5 B9 27 0A A9 EB
0E99:FD C1 86 0D EA 02 36 43 D5
0EA1:47 15 4E C0 18 1E C0 18 4F
0EA9:6D 86 6A 6D A4 6D 46 6A 14
0EB1:80 FD 30 B4 01 54 3C 3C EC
0EB9:E8 8A 75 8D 60 66 8D 9A C6
0EC1:48 9C 40 0A 9E 44 0C 04 F3
0EC9:8C 80 8D 9B 21 01 9D 1E 1E
0ED1:8D 13 EE 9F 20 04 93 0F 98
0ED9:82 0E E2 A8 20 A5 0F D3 2B
0EE1:AB F1 60 6B A9 C9 FF F0 78
0EE9:22 C9 28 F0 E0 43 F0 21 B4
0EF1:C9 16 F0 14 A8 1B FC A7 2B
0EF9:A0 F0 2E 55 FD D9 66 D0 B2
0F01:09 E9 3E 8A 0E 21 42 60 68
0F09:60 A8 B0 88 B8 20 20 E0 87
0F11:35 08 10 A9 2E D0 02 A9 CA
0F19:20 8D E0 1E 10 93 98 1E C6
0F21:AA C7 15 A8 F0 1B 5C 86 E6
0F29:68 90 08 2E F0 95 20 D0 72
0F31:0C 67 98 41 E0 89 86 91 22
0F39:FB 13 1D A2 C6 50 BE 30 0D
0F41:42 40 39 20 97 E0 A5 8F D4
0F49:29 0F F0 30 1F F7 2B 8A 9A
0F51:83 38 FD 92 2E 42 25 44 31
0F59:29 F0 1D 2E DF FD 60 58 DE
0F61:80 09 90 39 93 88 F0 31 79
0F69:38 ED 93 01 26 90 29 C8 30
0F71:BF A0 CD 85 AD 4A E6 08 16
0F79:C9 6A 07 20 CD AA A4 04 60
0F81:C9 04 3E DF F9 60 2C 32 27
0F89:00 CD 84 1E B0 0F 5B 87 8D
0F91:02 1C 82 C6 20 B0 E2 1C 1A
0F99:AD 95 1E 29 01 72 9B 8A DD
0FA1:B7 20 DC 10 54 8C FE 67 7A
0FA9:A5 8B 59 D9 F0 03 71 A8 65
0FB1:F0 FE 59 29 A8 48 83 63 96
0FB9:0E E9 B6 16 AA 6F 03 1E C8
0FC1:83 A9 02 A0 1C 2A DE 7C 1A
0FC9:38 00 0C 50 08 91 27 07 66
0FD1:09 99 26 7A 64 22 1A 99 C0
0FD9:0A 3B 90 40 BF C5 0C 06 15
0FE1:58 BC F0 C0 80 45 10 BB 7A
0FE9:C9 0D 90 F3 B3 AC EF 39 EA
0FF1:8A 83 2A D2 B0 E2 0F 08 DF
0FF9:24 E3 26 11 EA 33 8C 41 77
1001:D0 D0 CD B9 E3 F0 C8 20 A7
1009:C8 58 D0 C1 3C 8E 1A 90 BA
1011:02 B0 E0 5C 55 A1 60 6C 9E
1019:40 DE AB 9C 52 14 17 4C AD
1021:38 B0 27 C6 23 19 48 72 5B
1029:15 1A 8A 20 19 12 A8 AD BD
1031:78 51 40 A2 38 98 60 A8 A1
1039:F0 C0 65 C3 E3 C9 3A B0 56
1041:CC D4 40 2B 0E 0B 8D 51 C0
1049:85 EA 0A C9 10 E2 34 A0 D9
1051:A0 4C B2 11 FB 01 94 89 D2
1059:62 4C B9 11 CA 78 45 A8 71
1061:90 06 A9 06 5E 85 C9 06 83
1069:90 3C 5D A8 9D A0 4E A1 C4
1071:AC 8E F7 3A 10 E2 C0 20 DB
1079:68 30 C0 A1 08 CD 0B 0F A8
1081:18 B3 09 47 04 8C 18 05 B7
1089:B9 41 02 2D 64 12 AC E0 8F
1091:54 C8 44 08 D0 EC 60 03 15
1099:67 A2 25 16 16 C0 45 20 7A
10A1:7F 12 B8 1D C1 F0 EA 60 F6
10A9:2A 12 39 7C 36 52 90 1E 8C
10B1:AA 16 20 24 03 DD 08 90 23
10B9:13 BD C3 1A C0 A5 90 0B B5
10C1:42 18 69 02 DD 2D 75 C0 A5
10C9:03 88 8B 03 CD AD 2C D0 7D
10D1:25 9A 11 EA 7B 38 BD 98 CC
10D9:AA 86 CD 1C 1F D0 0D FA BD
10E1:11 38 BE 40 F0 CF EB AE C1
10E9:A4 1E 9D 99 41 91 03 A3 2B
10F1:36 F0 BF 28 98 62 47 E1 A2
10F9:16 4C E4 0E D8 FB 12 EE 7F
1101:9F E5 D2 A0 8F A3 8C 47 3C
1109:2A 8C 84 17 B6 40 A1 58 B7
1111:DF 18 25 99 46 05 7A 0B AD
1119:02 F0 0C FA C9 E4 F9 DE 5E
1121:D0 DD 20 BE 13 AD 3E 85 64
1129:BD C1 D0 C9 15 D0 1D C5 3D
1131:EA 22 63 43 33 FF 74 FA 6F
1139:82 A6 13 72 CD 04 D0 EB DB
1141:20 72 09 F6 B9 14 35 A0 C9
1149:83 CF F6 1C 90 A9 7A BC 9E
1151:8B 8E 82 67 08 03 4C D0 59
1159:4A FE 10 57 CE A9 32 EC 46
1161:93 8E A2 B6 48 1A 8C CF 44
1169:CD 79 3E 21 32 3C 3C 8A 30
1171:C9 27 B0 13 C9 26 B0 0A DB
1179:C9 25 B0 01 94 2B 8D 36 92
1181:10 40 50 38 C0 44 C1 AD 91
1189:B0 40 AB B1 C5 08 B2 1E 76
1191:6D B3 1E D0 05 00 5F 97 A6
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1199:6F 30 83 08 1E 0C B0 02 F4
11A1:A9 0C D6 89 48 3C 8C 01 5C
11A9:23 62 2B A7 13 F5 70 0C 33
11B1:85 A0 06 06 E6 16 F0 19 6A
11B9:B0 5C 0A 83 1B E4 DC A9 94
11C1:21 D2 4C 59 FB 96 20 1C DE
11C9:08 78 D0 F0 15 A8 1E 20 DE
11D1:DE 72 1E 8D A0 28 CE 00 DF
11D9:60 98 48 22 BF 68 A8 B1 20
11E1:FD CA 85 F7 60 A0 3E 38 20
11E9:8D 80 B5 E4 88 60 94 D1 B8
11F1:38 24 02 77 68 00 20 55 C9
11F9:36 0B 8D F8 3B 8C 27 1C B1
1201:02 02 8D 28 23 05 8D 29 4C
1209:30 02 07 8D 2A D0 A9 0D 74
1211:8D F9 E1 04 0E 8D FA 46 D9
1219:0F 8D FB 60 21 C5 52 2D 9F
1221:B3 20 6D 44 68 3C A0 13 A1
1229:36 16 D0 0C 19 34 03 A0 09
1231:1C 44 05 B4 8D FC 07 24 F2
1239:60 1B D0 60 70 05 19 0B 49
1241:02 CD C2 46 41 B1 0B D0 4E
1249:2C 64 14 2A 15 20 14 15 28
1251:4C 1D 15 A9 40 E4 71 84 1D
1259:80 7A 10 EA C0 B1 03 69 49
1261:6C 60 24 A3 60 88 2F 87 9D
1269:21 01 07 A5 1D 41 A0 2E F6
1271:4C 5C 14 D1 8F 34 85 38 03
1279:EE A6 29 FE BA 29 52 29 1C
1281:FB 28 05 0E 0A 6C D0 85 58
1289:FC CB 85 FD A9 30 85 FE C7
1291:67 9D 8C 3D 91 FD C8 D0 1D
1299:F9 E6 FC E6 FE E2 25 10 60
12A1:D0 F0 A5 C8 5B 85 01 AD 4C
12A9:1C 09 01 8D 0E DC AD 01 57
12B1:1F 18 29 F3 69 0C 8D 18 4E
12B9:D0 08 6F BD 18 1E 9D E0 67
12C1:37 E8 E0 20 D0 F5 60 A2 9B
12C9:00 70 CE 2E 76 30 D0 0E EA
12D1:B9 A5 A2 2A 74 BB 15 50 40
12D9:43 91 E8 E8 57 CD E0 60 C3
12E1:64 C9 C4 C9 0C 90 71 20 85
12E9:4E 09 20 5D C5 0F 85 C2 89
12F1:A2 03 CB 55 88 06 E0 A8 BD
12F9:F0 3E F9 28 16 03 D0 EA 31
1301:6D 24 8A 1E 29 03 F0 0B 5C
1309:3B C9 FD D0 05 20 37 16 39
1311:F0 21 88 B8 97 10 4C CA F4
1319:F0 2A A0 00 E0 02 B0 C6 8D
1321:AE C2 71 3C BD 8B 1E A2 3C
1329:01 9D 12 B7 4C 36 16 A9 06
1331:20 91 FB 78 B8 07 CC 09 57
1339:99 A1 1E 20 FA 09 4C 14 03
1341:17 C5 25 6A 09 B1 FB AE 65
1349:94 DD 43 1E D4 A0 87 28 DB
1351:01 60 20 80 09 68 ED 03 E4
1359:E3 D0 32 AD AE 00 49 C0 8F
1361:05 0A 07 8D 68 AD 43 1A E0
1369:8D 64 A0 01 83 0A 07 A4 8A
1371:07 B9 70 DB 99 6F DB C8 60
1379:C0 28 D0 EF AD 86 C0 79 A5
1381:41 07 AD 88 1E 8D 97 DB 7A
1389:60 CE AF 1E 60 CB 55 EE 37
1391:A8 DA 53 04 95 3B 14 0A D9
1399:15 68 BC 43 05 20 C1 3B 97
13A1:D0 0C 28 95 8C 87 A2 2B 84
13A9:60 67 12 0B 18 96 0C 85 85
13B1:F3 E6 AB 78 C9 30 79 E8 73
13B9:10 B1 42 A6 C3 50 27 47 FB
13C1:17 82 64 36 6E 7C 1A 65 03
13C9:A4 01 64 EA 8C 17 4C 83 9A
13D1:17 AD 83 E0 AD 10 40 21 BC
13D9:11 DE F3 44 E4 14 10 0B A5
13E1:0E AD 80 70 0D EA F3 34 C1
13E9:F0 14 AD C0 03 CD 01 1D BD
13F1:08 7F 00 F6 14 4C FC 14 4B
13F9:B6 63 56 9E 8E 44 7A 3A BD
1401:41 72 3A 47 A4 4A 43 3A 31
1409:EE 74 E9 A8 84 A7 23 81 18
1411:A7 87 43 3A 8A A4 A9 80 B5
1419:A2 E0 A0 F8 4C 92 17 A9 F2
1421:01 A2 07 A0 1F 8D C4 83 99
1429:FA 37 8D C1 03 8E C7 03 4F
1431:8C CA 03 60 70 9C E5 01 7B
1439:1E 96 00 1C 96 FE 1D 96 59
1441:0A 8F 36 38 D0 6D FA A8 77
1449:9A 07 2B D0 A0 00 1C 2F 5F
1451:C2 01 10 8C 4B A1 10 02 E8
1459:74 29 EF 0D 86 20 DD 41 86
1461:A3 8D 09 D0 DA AA C0 D0 C0
1469:0A 81 22 10 72 86 65 18 CC
1471:CE BA 33 90 01 62 A2 00 F5
1479:DC 29 0F 8D 75 04 68 1C BD
1481:8A 25 70 B8 08 C7 A1 F8 6D
1489:01 87 3B 4C 08 20 E8 03 D5
1491:70 EE E4 AD BB 1E 29 01 CE
1499:3D 06 20 E8 02 0A BA 72 94
14A1:46 C0 03 08 22 30 1A 19 1D
14A9:C9 01 28 0D B4 18 C9 02 68
14B1:CA 8B E1 18 4C 7B 18 A9 0A
14B9:0B 8D AA 1E AD A0 96 8B AA
14C1:01 4C FA 12 97 13 2E FD 61
14C9:4C 49 0F 56 B6 C1 C0 0C FB
14D1:90 1B 53 7A 64 FC C4 03 BE
14D9:53 76 47 54 46 59 A7 B0 0F
14E1:07 9E 56 C6 41 A0 06 D5 DA
14E9:95 8F 53 16 E2 D2 B0 18 68
14F1:97 97 51 12 01 4F D9 1D 2D
14F9:51 19 25 C5 46 C0 83 1F 6D
1501:C0 A1 B0 1B A3 1E 19 3F C2
1509:02 F1 FC CC 31 00 3F A0 C5
1511:00 3F C0 07 90 07 25 08 86
1519:1C A0 A8 8C EC 15 4C F5 A1
1521:18 18 4B C9 0D 90 47 A0 3D
1529:B0 1F 6D 17 C0 3B 90 18 BE
1531:88 ED 44 20 47 19 D0 08 ED
1539:0B 87 DB 24 00 AC 89 0C 5A
1541:80 33 2C 00 4C AD 84 55 75
1549:54 09 40 1D 20 60 09 5D AB
1551:5A AC 83 05 EE 05 42 1C C0
1559:15 20 4D F0 01 60 AD 85 39
1561:1E 38 E9 02 29 07 D0 03 10
1569:05 73 38 60 F9 4C F2 08 EE
1571:AD 11 D0 10 FB A2 01 EE 2D
1579:78 8E 8B 34 40 61 B9 8A BD
1581:1E AA B9 8B 1E A8 AD C5 0A
1589:0B 20 AB 19 AE 89 94 29 36
1591:C8 C8 E8 E0 04 D0 DF 4C EC
1599:A1 17 0A 8D 97 43 8C 08 5F
15A1:8A 8A 68 0A 90 02 A0 01 30
15A9:8C B2 04 74 00 D0 8A 4A 31
15B1:AA CA AD 64 F0 06 3D 3D 37
15B9:EA 97 1E F0 03 1D 40 60 7F
15C1:52 10 D0 AD 88 1E AE 86 AE
15C9:1E 9D 01 D0 60 86 FD 84 35
15D1:FE A9 00 8D EC 02 AC 42 C9
15D9:02 0F F0 30 34 23 C9 FF AB
15E1:F0 47 8D 5F F3 41 41 C6 EB
15E9:1F 9C 6C 78 B4 20 77 54 49
15F1:08 75 A4 01 42 20 2B 1A 25
15F9:77 4C EB 19 D5 15 64 4C 1A
1601:40 41 06 C8 B1 FD 84 FD 77
1609:C8 8C 83 74 B3 C0 71 AE A6
1611:0F 07 BC E0 09 0A 87 58 04
1619:C0 06 F0 CA D0 F2 60 AE B3
1621:B6 29 AC 32 20 0A 1B AC B7
1629:84 11 A9 A0 34 05 88 5A 3C
1631:AD D0 F7 12 16 EC 20 EC 1A
1639:EC AD 48 4A 21 03 0F 85 AD
1641:44 C1 01 12 CE 3B 05 20 CE
1649:42 1A EE 98 50 18 38 ED C5
1651:90 44 7E C3 00 06 18 6D 98
1659:82 86 00 02 CE 7F 1E AD E6
1661:81 1E 8D 80 1E 4C 5F 1A 8A
1669:CA 5B 20 27 04 47 05 40 CF
1671:66 06 24 06 47 72 32 24 C3
1679:18 F0 0B EE 32 09 A9 FC 44
1681:E8 21 60 AD 2E 04 C9 01 67
1689:F0 08 A9 20 AE E0 05 9D 08
1691:C5 07 CE B5 1E 60 A9 06 63
1699:A0 00 C8 05 D8 44 D9 99 A4
16A1:00 DA 99 98 DA C8 D0 F1 CE
16A9:60 8A 85 FB A9 04 85 FC 7E
16B1:C0 00 F0 06 20 C0 05 FF CA
16B9:88 D0 F6 60 A0 27 91 FB 04
16C1:88 C0 FF D0 F9 4C E4 00 3A
16C9:7D 04 A8 0C E4 03 43 3E 83
16D1:8A 49 B8 81 07 38 00 3B 19
16D9:03 0F 06 08 03 1C A0 A9 FF
16E1:04 0D 2A 1C 38 00 0F 0B 45
16E9:0A 00 1C 0B 00 CE 04 25 B7
16F1:03 80 0C 05 18 64 99 50 67
16F9:08 BD 07 00 0A 13 14 00 3F
1701:21 13 C2 C3 82 18 00 14 A1
1709:14 02 22 12 93 81 16 01 F6
1711:6A 08 B8 E2 07 01 0E 1B 2F
1719:01 1A 03 30 0C 02 0E 08 3E
1721:BB 19 08 20 A8 0B 0F 1F 25
1729:A8 0F 03 02 0E 02 02 1E 8A
1731:CA 38 07 13 08 08 5C 16 14
1739:40 07 42 03 05 19 CD 1F 09
1741:5E BA 81 08 59 00 18 0C 05
1749:11 C2 16 11 22 67 11 01 56
1751:00 93 01 00 1F 15 09 84 68
1759:2A 1E 60 06 0E 60 03 46 CE
1761:66 03 9A 0B 27 D9 85 09 3C
1769:00 05 23 46 18 1E 0A 28 17
1771:08 06 97 85 82 0A 60 05 72
1779:64 08 0B 07 03 19 0B 80 C0
1781:23 0B 25 04 5C 0E 0D 10 2E
1789:0E 00 1E 10 06 0A 1E 0D 25
1791:07 06 03 11 13 00 1A 13 16
1799:0E C2 B9 36 2E 8A 81 22 DA
17A1:18 2E 0A 2A 20 60 94 80 77
17A9:AC 04 07 A2 84 89 62 A0 E9
17B1:0B 19 19 68 C6 E0 02 FC 10
17B9:80 B8 D8 18 0B 68 06 0A 03
17C1:34 B8 28 BE E0 02 C0 80 3A
17C9:0A 4C 06 C0 00 06 0B 64 6F
17D1:A0 D0 03 04 19 12 04 04 42
17D9:20 12 82 CF 00 CA 06 8C AD
17E1:C0 40 08 33 12 D0 0C 16 B6
17E9:34 03 1F CD 40 23 01 B5 F9
17F1:27 20 F8 03 10 0C 03 02 C3
17F9:10 1A C0 57 04 E4 A1 08 43
1801:39 80 89 06 66 06 42 26 75
1809:23 06 0A 01 30 1C 1E 08 D3
1811:E4 05 40 16 0C E4 0C 04 6E
1819:01 27 0C 42 F3 04 65 A0 54
1821:08 19 12 68 06 16 9A 81 A3
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1829:1F 66 01 23 12 03 00 00 71
1831:80 17 00 08 15 0B 00 16 D2
1839:15 0A 00 23 15 05 FF C0 26
1841:F0 7F F0 F1 C0 FC F7 C0 B1
1849:BC 0B FE 88 80 80 B0 14 7E
1851:25 20 F9 00 7F E9 00 3F 3E
1859:89 00 3E 40 5C 18 40 10 ED
1861:32 04 00 48 09 00 30 09 E1
1869:FE 0A 3E 03 8F 40 BB EF 78
1871:3F 7F 26 01 20 02 85 0D 17
1879:08 00 9F 54 02 97 FE 00 53
1881:91 FC 2A 00 3B 90 D2 00 C0
1889:08 85 40 90 12 00 90 0C ED
1891:CB 52 08 14 20 C5 45 1C 3D
1899:0E 05 42 21 FF C3 FF 0F 8A
18A1:C3 F0 0F FF F0 50 71 81 FE
18A9:3F FF FC 4E A0 3C 18 C2 E6
18B1:18 94 05 10 80 23 05 19 68
18B9:81 55 98 04 90 8F 09 05 2D
18C1:02 01 09 96 13 76 E0 01 F2
18C9:0C 81 0E 14 1A 06 01 14 62
18D1:07 7B 18 06 05 B1 25 0A 0B
18D9:05 01 18 07 7D 1F 05 A1 54
18E1:0B 20 08 1A 28 EE 00 21 60
18E9:09 6C A0 06 39 22 0A 01 95
18F1:31 07 0D 19 04 13 06 00 28
18F9:0C D0 15 00 0F 10 01 BC 7E
1901:0C 11 01 12 C0 01 01 15 DF
1909:0F 03 3C 12 90 09 15 13 12
1911:5A 12 14 04 04 03 18 0F 23
1919:00 3E 12 01 00 18 13 04 B7
1921:00 1E 0F 04 01 1E 10 04 A1
1929:FF 00 6B 7F 3E 77 3E 7F 8C
1931:6B E0 82 2F 80 00 3C 3C 4D
1939:00 00 1C C8 08 FF FF A0 5C
1941:02 08 42 42 7E 7E 8E 1F 0D
1949:93 08 00 FD FB F7 02 04 EE
1951:08 02 05 07 01 02 03 03 32
1959:03 06 09 0C 0C 0C FA C8 BF
1961:96 64 32 50 52 45 53 53 E4
1969:20 42 55 54 A0 C2 0F 4E A8
1971:20 54 4F 20 50 4C 41 59 44
1979:10 4F C8 45 58 54 52 41 EE
1981:3A 00 12 20 92 4C 45 56 BB
1989:45 4C 3A 00 EA 00 00 00 10
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CD+

By Daniel Lightner

Character Designer (September 1992) is a utility program that lets you create your own characters and use them to set up animation sequences. With its sketch pad you can create a design, character, or picture that you can save as a sequential file.

CD+ is a special addition to Character Designer (CD) that lets you use the original program to design high-resolution bitmapped graphics. (Note: You will need a copy of Character Designer in order to use CD+.)

CD+ is written in machine language. To enter it, use MLX, Gazette's machine language entry program, which you'll find elsewhere in this section. When MLX prompts for starting and ending addresses, supply the following values.

Starting address: 0801
Ending address: 1003

When you have finished entering the program, be sure to save a copy of it to a disk that contains the original Character Designer program. Character Designer must be named CD, because CD+ looks for that name and loads it while booting.

Using the Program

To use CD+, just load and run it as you would any BASIC program. CD+ then loads and activates Character Designer. The program begins on CD's work screen. Using CD's design and drawing features, you can create an image in the program's sketch window. When you have finished sketching, press the back arrow key to exit Sketch mode and then press the asterisk key (*). At this point, you'll see a menu new to Character Designer.

CD Bitmap Menu

Option 1 is Enter Bitmap Mode. Select this first option by pressing the 1 key. If the screen contains garbage, press Shift and Clr/Home simultaneously to clear it. Press Return whenever you wish to return to the Bitmap menu.

Your cursor will appear as four visible corners that define a section of the screen. You can move to a new section of the screen using your joystick or the cursor keys. If you wish to stamp the image from the sketch window into one of these 12 screen sections, move to the desired section and press either the fire button or the f7 key.

You may stamp the image into as many of the sections as you like. If you want to remove an image, press the Clr/Home key without using the Shift key.

Color

CD+ allows you to enter different colors in different areas of the screen. This color depends on the color used in the sketch window. If you need to color a section of the screen but don't wish to stamp the graphic image there, just press the C key. That section of the screen will change to the background color of the sketch window, but it won't contain any graphics. You can equalize the color of the entire screen by pressing the E key.

By pressing the f1 key, you can transfer whatever image is under the markers to the sketch window. This is just the opposite of pressing f7. You can toggle the markers on and off by pressing the asterisk key. Remember, to exit Bitmap mode, just hit the Return key.

Loading and Saving

Option 2 lets you load a bitmap from disk. Doodle sketches will load into CD+ just fine.

Option 3 lets you save a screen to disk. This gives you a more powerful way to save character sets created using Character Designer. Just store them in the sketch window as you create them. When you wish to save them, stamp them on the bitmap and save the file. Later, you can load the bitmap and add more characters or take some or all from the bitmap and save them as sequential files using Character Designer's old Save option.

Disk Commands

Option 4 lets you enter a disk command. Be sure that you have the desired disk in the drive.

Disk commands should follow the same format that is used when opening the command channel to drive 8, except for the NEW disk command.

The COPYFILE command is C0: or C: followed by the new filename, an equal sign, and the old name. Here's an example.

C0:NEW FILE=ORIGINAL FILE

The RENAME FILE command works with a similar syntax.

R0:NEW NAME=OLD NAME

The SCRATCH command is S0: followed by the filename to be scratched. Wildcards are allowed. INITIALIZE is I0, and VALIDATE is V0.

The NEW command to format a disk works a little different from what you're

used to. The syntax for this command is N0: followed by a disk name, but don't enter a unique ID at this point. Simply press Return. You will then be prompted for a two-character ID. Enter an ID and press Return again.

While in Disk Command mode, entering a dollar sign ($) will give you the disk directory. You don't have to use quotation marks. To abort any of the above options, simply press the asterisk key and then press Return. The last option (5) will return you to Character Designer.

Doodle Converter

Although CD+ can load Doodle bitmaps, Doodle cannot load CD+ bitmaps. So I've included a short utility program that will convert CD+ bitmaps to Doodle.

CD Doodle is written in machine language, and it will have to be entered with MLX. When entering it, use the following addresses.

Starting address: 0801
Ending address: 0BAD

Be sure to save a copy of CD Doodle to disk before leaving MLX.

First create and save a bitmap from CD+. Then exit to BASIC and load and run CD Doodle. You will be prompted for the filename that you used to save the bitmap graphic. Enter that filename and press Return. Be sure that the disk containing the graphic is in the drive.

After the file loads, the program prompts you to place a disk in the drive onto which you want to save the converted image. Do this and press the spacebar when ready.

CD Doodle will save the file as DD plus the filename that you used. This file can now be used in Doodle.

CD+

```
0801:22 08 0A 00 9E 32 30 38 BB
0809:38 20 43 44 2B 20 31 39 5F
0811:39 33 3A 20 43 4F 4D 50 16
0819:55 54 45 20 20 20 20 20 75
0821:00 00 00 75 07 00 80 AD 6F
0829:24 08 8D B2 02 AD 25 08 43
0831:8D B3 02 AD 26 08 85 FD 6A
0839:AD 27 08 85 FE A9 8E 85 84
0841:FB A9 08 85 FC 18 A5 FB A2
0849:6D B2 02 8D B4 02 A5 FC CB
0851:6D B3 02 8D B5 02 A0 00 15
0859:B1 FB 91 FD 18 A5 FB 69 0C
0861:01 85 FB A5 FC 69 00 85 40
0869:FC 18 A5 FD 69 01 85 FD EA
0871:A5 FE 69 00 85 FE A5 FB B0
0879:CD B4 02 F0 03 4C 88 08 4F
0881:A5 FC CD B5 02 F0 03 4C DE
0889:59 08 6C 26 08 A9 02 8D B0
0891:34 03 A9 43 8D 35 03 A9 D6
0899:44 8D 36 03 20 02 84 A9 E1
08A1:00 A2 FF A0 FF 20 D5 FF 90
08A9:A9 28 8D 39 09 A9 80 8D 5B
08B1:3A 09 4C 28 08 20 E4 FF B7
08B9:C9 2A F0 03 4C 95 09 AD FF
08C1:51 21 0A 0A 0A 0A 8D 72 AA
08C9:87 AD 21 D0 29 0F 0D 72 4C
08D1:87 8D 72 87 AD 10 D0 8D AC
08D9:6F 87 AD 00 D0 8D 70 87 5E
08E1:AD 01 D0 8D 71 87 AD 18 19
08E9:D0 29 0F 09 A0 8D 18 D0 5B
08F1:A9 28 8D 88 02 A9 00 8D 5F
08F9:15 D0 A9 93 20 D2 FF A0 24
0901:00 B9 68 85 20 D2 FF C8 FB
0909:C0 6B D0 F5 20 E4 FF C9 2E
0911:31 F0 1B C9 32 F0 1A C9 4B
0919:33 F0 19 C9 34 F0 18 C9 20
0921:35 D0 E9 A9 01 8D 15 D0 13
0929:20 B0 80 4C DB 08 4C E0 C4
0931:80 4C 83 83 4C C1 83 20 CF
0939:C4 84 4C 59 80 AD 18 D0 A9
0941:29 0F 09 10 8D 18 D0 A9 E5
0949:04 8D 88 02 AD 6F 87 8D B9
0951:10 D0 AD 70 87 8D 00 D0 9F
0959:AD 71 87 8D 01 D0 60 A0 15
0961:00 B9 D3 85 99 00 50 C8 EA
0969:C0 00 D0 F5 60 AD 27 D0 2E
0971:8D 28 D0 8D 29 D0 8D 2A 19
0979:D0 20 D2 80 A9 40 8D F8 C0
0981:47 A9 41 8D F9 47 A9 42 25
0989:8D FA 47 A9 43 8D FB 47 34
0991:AD 18 D0 29 F0 09 20 29 42
0999:0F 09 10 8D 18 D0 A9 44 EB
09A1:8D 88 02 20 9A 82 AD 18 31
09A9:D0 09 08 8D 18 D0 AD 11 B0
09B1:D0 09 20 8D 11 D0 A9 0F 79
09B9:8D 15 D0 AD 02 DD 09 03 69
09C1:8D 02 DD AD 00 DD 29 FC 78
09C9:09 02 8D 00 DD AE 6E 87 A0
09D1:E0 03 D0 03 4C 53 82 E0 F4
09D9:07 D0 03 4C 53 82 E0 0B 3A
09E1:D0 03 4C 53 82 A9 00 8D 24
09E9:10 D0 A2 00 AD CA 02 C9 F2
09F1:01 F0 F9 20 E4 FF 20 20 89
09F9:83 C9 00 F0 EF A2 01 8E E9
0A01:CA 02 C9 1D F0 76 C9 9D 98
0A09:F0 6F C9 88 F0 62 C9 93 6B
0A11:F0 61 C9 13 F0 57 C9 2A 03
0A19:F0 5C C9 43 F0 46 C9 45 A3
0A21:F0 45 C9 85 F0 3B C9 0D A5
0A29:D0 C2 A9 00 8D 15 D0 AD 9B
0A31:18 D0 29 F0 69 0C 09 04 4B
0A39:29 0F 09 10 8D 18 D0 A9 DF
0A41:04 8D 88 02 AD 11 D0 29 68
0A49:DF 8D 11 D0 AD 02 DD 09 1A
0A51:03 8D 02 DD AD 00 DD 29 BA
0A59:FC 09 03 8D 00 DD 4C 59 D0
0A61:80 4C 4F 83 4C 74 82 20 44
0A69:01 83 4C 5F 81 4C C4 82 A7
0A71:4C 5B 82 4C 23 82 4C EC 40
0A79:82 4C 0A 82 AD 6E 87 18 99
0A81:69 01 C9 0C F0 09 8D 6E B9
0A89:87 20 9A 82 4C 40 81 A9 F4
0A91:00 8D 6E 87 4C FC 81 AD 56
0A99:6E 87 38 E9 01 30 09 8D D4
0AA1:6E 87 20 9A 82 4C 40 81 C3
0AA9:A9 0B 8D 6E 87 4C 15 82 08
0AB1:A9 00 85 FB A9 60 85 FC E1
0AB9:20 01 83 A0 00 A9 00 91 D0
0AC1:FB 18 A5 FB 69 01 85 FB A4
0AC9:A5 FC 69 00 85 FC A5 FB 84
0AD1:C9 41 F0 03 4C 30 82 A5 37
0AD9:FC C9 7F D0 E0 4C 40 81 16
0AE1:A9 0F 8D 10 D0 4C 5D 81 35
0AE9:20 6B 83 A0 00 B1 FD 91 B7
0AF1:FB C8 C0 50 D0 F7 20 B0 AA
0AF9:82 20 BE 82 E8 E0 08 D0 03
0B01:EA AE 6E 87 BD 3E 87 85 F9
0B09:FB BD 4A 87 85 FC A2 00 B3
0B11:A0 00 AD 72 87 91 FB C8 97
0B19:C0 0A D0 F6 20 64 1A E8 4B
0B21:E0 08 D0 EC 4C 40 81 AE A7
0B29:6E 87 BD 32 87 AA A0 00 5B
0B31:BD D2 86 99 00 D0 C8 E8 03
0B39:C0 08 D0 F4 60 18 A5 FB C5
0B41:69 40 85 FB A5 FC 69 01 81
0B49:85 FC 60 20 72 1A 4C 72 76
0B51:1A AE 6E 87 BD 56 87 85 42
0B59:FB BD 62 87 85 FC A2 00 07
0B61:A0 00 A9 00 91 FB C8 C0 CB
0B69:50 D0 F7 20 B0 82 20 BE 6B
0B71:82 E8 E0 08 D0 EA 4C 74 DE
0B79:82 AD 15 D0 D0 08 A9 0F F4
0B81:8D 15 D0 4C 40 81 A9 00 DD
0B89:8D 15 D0 4C 40 81 A9 00 E5
0B91:85 FD A9 44 85 FE A2 00 D0
0B99:A0 00 AD 72 87 91 FD C8 24
0BA1:C0 28 D0 F6 20 72 1A E8 93
0BA9:E0 19 D0 EC 60 8D 73 87 07
0BB1:AD 00 DC 29 10 C9 10 D0 65
0BB9:1A AD 00 DC 29 0F 8D 74 2B
0BC1:87 A9 0F 38 ED 74 87 C9 85
0BC9:04 F0 0B C9 08 F0 0A AD E1
0BD1:73 87 60 A9 88 60 A9 9D E0
0BD9:60 A9 1D 60 20 6B 83 A0 8A
0BE1:00 B1 FB 91 FD C8 C0 50 E1
0BE9:D0 F7 20 B0 82 20 BE 82 0A
0BF1:E8 E0 08 D0 EA 4C 40 81 4D
0BF9:AE 6E 87 BD 56 87 85 FB A7
0C01:BD 62 87 85 FC A9 80 85 EE
0C09:FD A9 32 85 FE A2 00 60 0C
0C11:A0 00 20 B0 80 A9 93 20 7A
0C19:D2 FF A9 00 8D 15 D0 B9 EB
0C21:42 85 20 D2 FF C8 C0 13 A4
0C29:D0 F5 20 15 84 AD 35 03 C4
0C31:C9 2A F0 12 20 02 84 A9 B3
0C39:00 A2 FF A0 FF 20 D5 FF 30
0C41:20 69 84 20 43 84 A9 93 69
0C49:20 D2 FF 4C 32 80 A0 00 BF
0C51:20 B0 80 A9 93 20 D2 FF 13
0C59:A9 00 8D 15 D0 B9 55 85 E6
0C61:20 D2 FF C8 C0 13 D0 F5 B4
0C69:20 15 84 AD 35 03 C9 2A B5
0C71:F0 1A 20 2A 84 20 02 84 5C
0C79:A9 00 85 FB A9 60 85 FC AD
0C81:A2 4E A0 7F A9 FB 20 D8 E0
0C89:FF 20 69 84 4C B9 83 AD 1D
0C91:34 03 A2 35 A0 03 20 BD 3B
0C99:FF A9 08 A2 08 A0 08 4C 66
0CA1:BA FF A0 00 8C 34 03 A9 10
0CA9:20 20 D2 FF A9 3E 20 D2 8D
0CB1:FF A0 00 20 E4 18 60 A0 DC
0CB9:00 A2 00 BD 3E 87 85 FD 6F
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0CC1:BD 4A 87 85 FE B1 FD 9D EC
0CC9:41 7F E8 E0 0C D0 EC 60 6B
0CD1:A9 60 8D 97 82 A2 00 8E 2F
0CD9:6E 87 BD 41 7F 8D 72 87 75
0CE1:20 74 82 AE 6E 87 E8 E0 A6
0CE9:0C D0 EC A9 4C 8D 97 82 BE
0CF1:A9 00 8D 6E 87 60 20 CC 42
0CF9:FF A5 BA 20 B4 FF A9 6F 3D
0D01:85 B9 20 96 FF A9 0D 20 9A
0D09:D2 FF A9 20 20 D2 FF 20 30
0D11:D2 FF 20 A5 FF C9 0D D0 05
0D19:F6 20 AB FF A0 00 A9 01 85
0D21:8D CA 02 AD CA 02 C9 01 C2
0D29:F0 F9 C8 C0 28 D0 EF 60 24
0D31:A9 0F A2 08 A0 0F 20 BA F4
0D39:FF AD 34 03 A2 35 A0 03 A3
0D41:20 BD FF 20 C0 FF A9 0F 45
0D49:20 C3 FF 20 69 84 4C CC 29
0D51:FF A0 00 B9 32 85 20 D2 E9
0D59:FF C8 C0 10 D0 F5 20 15 72
0D61:84 AD 35 03 C9 24 F0 09 C9
0D69:C9 4E F0 12 C9 2A D0 C0 94
0D71:60 A9 01 8D 15 D0 20 B0 FB
0D79:80 68 68 4C C9 1A A0 00 B7
0D81:B9 25 85 20 D2 FF C8 C0 5D
0D89:0D D0 F5 20 CF FF 48 20 4E
0D91:CF FF 48 AC 34 03 A9 2C 94
0D99:99 35 03 68 99 37 03 68 CC
0DA1:99 36 03 EE 34 03 EE 34 25
0DA9:03 EE 34 03 AD 35 03 4C 4C
0DB1:DF 84 0D 0D 55 4E 49 51 17
0DB9:55 45 20 49 44 3F 20 0D D4
0DC1:0D 44 49 53 4B 20 43 4F 82
0DC9:4D 4D 41 4E 44 20 3F 0D 19
0DD1:0D 20 20 4C 4F 41 44 20 6B
0DD9:46 49 4C 45 20 4E 41 4D 51
0DE1:45 3F 0D 0D 20 20 53 41 4A
0DE9:56 45 20 46 49 4C 45 20 0F
0DF1:4E 41 4D 45 3F 11 11 20 02
0DF9:2A 20 43 44 20 42 49 54 CE
0E01:4D 41 50 20 4D 45 4E 55 91
0E09:20 2A 0D 0D 31 2E 20 45 F9
0E11:4E 54 45 52 20 42 49 54 28
0E19:4D 41 50 20 4D 4F 44 45 AD
0E21:0D 0D 32 2E 20 4C 4F 41 42
0E29:44 20 42 49 54 4D 41 50 F6
0E31:0D 0D 33 2E 20 53 41 56 87
0E39:45 20 42 49 54 4D 41 50 87
0E41:0D 0D 34 2E 20 44 49 53 88
0E49:4B 20 43 4F 4D 4D 41 4E E0
0E51:44 0D 0D 35 2E 20 45 58 9C
0E59:49 54 20 54 4F 20 43 44 3E
0E61:FF E0 00 C0 00 00 C0 00 43
0E69:00 C0 00 00 C0 00 00 C0 7C
0E71:00 00 C0 00 00 C0 00 00 A8
0E79:00 00 00 00 00 00 00 00 95
0E81:00 00 00 00 00 00 00 00 9D
0E89:00 00 00 00 00 00 00 00 A5
0E91:00 00 00 00 00 00 00 00 AD
0E99:00 00 00 00 00 00 00 00 B5
0EA1:00 07 FF 00 00 03 00 00 8B
0EA9:03 00 00 03 00 00 03 00 7D
0EB1:00 03 00 00 03 00 00 03 A9
0EB9:00 00 00 00 00 00 00 00 D5
0EC1:00 00 00 00 00 00 00 00 DD
0EC9:00 00 00 00 00 00 00 00 E5
0ED1:00 00 00 00 00 00 00 00 ED
0ED9:00 00 00 00 00 00 00 00 F5
0EE1:00 00 00 00 00 00 00 00 FD
0EE9:00 00 00 00 00 00 00 00 06
0EF1:00 00 00 00 00 00 00 00 0E
0EF9:00 00 00 00 00 00 00 00 16
0F01:00 00 00 00 00 00 00 C0 DF
0F09:00 00 C0 00 00 C0 00 00 42
0F11:C0 00 00 C0 00 00 C0 00 1D
0F19:00 C0 00 00 FF E0 00 00 EA
0F21:00 00 00 00 00 00 00 00 3F
0F29:00 00 00 00 00 00 00 00 47
0F31:00 00 00 00 00 00 00 00 4F
0F39:00 00 00 00 00 00 00 00 57
0F41:00 00 00 00 00 00 00 00 5F
0F49:00 03 00 00 03 00 00 03 43
0F51:00 00 03 00 00 03 00 00 DB
0F59:03 00 00 03 00 07 FF 18 5D
0F61:32 50 32 18 5D 50 5D 66 C1
0F69:32 A1 32 66 5D A1 5D B6 98
0F71:32 F2 32 B6 5D F2 5D 07 8F
0F79:32 41 32 07 5D 41 5D 18 7A
0F81:72 50 72 18 9D 50 9D 66 8C
0F89:72 A1 72 66 9D A1 9D B6 63
0F91:72 F2 72 B6 9D F2 9D 07 5A
0F99:72 41 72 07 9D 41 9D 18 45
0FA1:B2 50 B2 18 DD 50 DD 66 57
0FA9:B2 A1 B2 66 DD A1 DD B6 2E
0FB1:B2 F2 B2 B6 DD F2 DD 07 25
0FB9:B2 41 B2 07 DD 41 DD 00 F7
0FC1:08 10 18 20 28 30 38 40 9F
0FC9:48 50 58 00 0A 14 1E 40 48
0FD1:4A 54 5E 80 8A 94 9E 44 26
0FD9:44 44 44 45 45 45 45 46 18
0FE1:46 46 46 00 50 A0 F0 00 64
0FE9:50 A0 F0 00 50 A0 F0 60 BD
0FF1:60 60 60 6A 6A 6A 6A 74 51
0FF9:74 74 74 00 00 00 00 00 FD
1001:00 00 00 00 00 00 00 00 21
```

CD DOODLE

```
0801:1E 08 0A 00 9E 32 30 38 B9
0809:38 20 00 00 00 00 00 00 3D
0811:00 00 00 00 00 00 00 00 21
0819:00 00 00 00 00 00 00 00 29
0821:00 00 00 00 00 00 00 20 51
0829:CC FF A0 00 A9 00 8D 20 3C
0831:D0 8D 21 D0 A9 93 20 D2 EC
0839:FF A9 9A 20 D2 FF 20 68 48
0841:0A 20 15 0A A0 00 B9 55 6F
0849:0B 20 D2 FF C8 C0 10 D0 7B
0851:F5 20 23 0A 20 E4 FF 20 1E
0859:B1 09 AD 3E 03 C9 24 F0 96
0861:07 C9 2A D0 09 4C E2 FC F5
0869:20 76 0A 4C 28 08 AC 3A 22
0871:03 A2 00 BD 65 0B 99 3E 50
0879:03 EE 3A 03 C8 E8 E0 05 EE
0881:D0 F1 20 36 0A CE 3A 03 E0
0889:AD 3A 03 A2 3E A0 03 20 24
0891:BD FF A9 02 A2 08 A0 02 4E
0899:20 BA FF 20 C0 FF 20 7B 2C
08A1:09 C9 0D F0 40 A2 02 20 0A
08A9:C6 FF A9 00 85 FD A9 60 2A
08B1:85 FE 20 E4 FF 20 E4 FF E0
08B9:A0 00 20 E4 FF 91 FD 18 C6
08C1:A5 FD 69 01 85 FD A5 FE CF
08C9:69 00 85 FE A5 FD C9 40 28
08D1:F0 0A 20 B7 FF C9 40 F0 F4
08D9:19 4C BB 08 A5 FE C9 7F BD
08E1:F0 10 4C D3 08 A2 00 20 20
08E9:C6 FF A9 02 20 C3 FF 4C 0F
08F1:42 08 A2 00 20 C6 FF A9 3F
08F9:02 20 C3 FF 20 15 0A A0 95
0901:00 B9 87 0B 20 D2 FF C8 38
0909:C0 26 D0 F5 20 15 0A A5 8D
0911:CB C9 40 F0 FA EE 3A 03 9D
0919:EE 3A 03 AC 3A 03 A9 57 E4
0921:99 3B 03 A9 44 8D 3C 03 9D
0929:8D 3D 03 AD 3A 03 A2 3C EB
0931:A0 03 20 BD FF A9 02 A2 81
0939:08 A0 02 20 BA FF A9 00 E2
0941:85 FB A9 5C 85 FC A2 FF 75
0949:A0 7F A9 FB 20 D8 FF 20 05
0951:15 0A 20 7B 09 C9 0D 20 D5
0959:15 0A A0 00 B9 71 0B 20 56
0961:D2 FF C8 C0 16 D0 F5 20 02
0969:E4 FF A5 CB C9 19 F0 07 FA
0971:C9 27 D0 F3 4C E2 FC 4C BF
0979:28 08 A5 BA 20 B4 FF A9 7F
0981:6F 85 B9 20 96 FF A9 0D FA
0989:A0 00 20 D2 FF 99 E4 02 4F
0991:C8 20 A5 FF C9 0D D0 F2 DB
0999:20 D2 FF 20 AB FF AD E5 11
09A1:02 C9 30 D0 08 AD E6 02 01
09A9:C9 30 D0 01 60 A9 0D 60 FA
09B1:A0 00 A9 00 8D 3A 03 20 C4
09B9:E4 FF C9 00 F0 F9 C9 14 8E
09C1:F0 39 C9 0D F0 20 C9 7B BB
09C9:B0 ED C9 20 90 E9 C9 22 CC
09D1:F0 E5 C9 2C F0 E1 AC 3A 74
09D9:03 C0 14 F0 DA 20 D2 FF 2C
09E1:20 F2 09 4C B8 09 AC 3A 24
09E9:03 C0 00 F0 CA 20 D2 FF 39
09F1:60 AC 3A 03 99 3E 03 EE 91
09F9:3A 03 60 AC 3A 03 C0 01 21
0A01:B0 03 4C B8 09 20 D2 FF B1
0A09:38 AD 3A 03 E9 01 8D 3A C4
0A11:03 4C B8 09 A9 0D 20 D2 F5
0A19:FF 20 D2 FF A9 96 20 D2 4A
0A21:FF 60 A9 0D 20 D2 FF 20 BF
0A29:D2 FF A9 9A 20 D2 FF A9 7B
0A31:3E 20 D2 FF 60 A9 00 85 F5
0A39:FB A9 5C 85 FC A0 00 A9 AD
0A41:B1 91 FB 18 A5 FB 69 01 84
0A49:85 FB A5 FC 69 00 85 FC F6
0A51:A5 FB C9 F8 D0 E9 A5 FC 76
0A59:C9 5F D0 E3 B9 69 0B 91 9D
0A61:FB C8 C0 08 D0 F6 60 A0 02
0A69:00 B9 0A 0B 20 D2 FF C8 F2
0A71:C0 4B D0 F5 60 A0 00 A9 61
0A79:00 8D 20 D0 8D 21 D0 A9 3E
0A81:93 20 D2 FF A9 01 A2 09 61
0A89:A0 0B 20 BD FF A9 02 A2 DD
0A91:08 A0 00 20 BA FF 20 C0 AA
0A99:FF A2 02 20 C6 FF A9 9A BC
0AA1:20 D2 FF A0 00 20 E4 FF CE
0AA9:20 E4 FF 4C B5 0A A5 CB B8
0AB1:C9 40 D0 28 20 E4 FF 8D 79
0AB9:B0 02 20 E4 FF 0D B0 02 90
0AC1:F0 35 20 E4 FF AA 20 E4 BD
0AC9:FF 20 CD BD A9 20 20 D2 5C
0AD1:FF 20 E4 FF F0 19 20 D2 89
0AD9:FF 4C D2 0A A5 CB C9 1B 07
0AE1:F0 04 C9 40 D0 F6 A5 CB 26
0AE9:C9 40 F0 FA 4C B5 0A A9 B7
0AF1:0D 20 D2 FF 4C AF 0A A9 CD
0AF9:00 20 C6 FF A9 02 20 C3 48
0B01:FF A5 CB C9 01 D0 FA 60 38
0B09:24 0D 43 44 2D 44 4F 4F 89
0B11:44 4C 45 0D 43 4F 50 59 27
0B19:52 49 47 48 54 20 31 39 D6
0B21:39 32 20 43 4F 4D 50 55 3E
0B29:54 45 0D 50 55 42 4C 49 F6
0B31:43 41 54 49 4F 4E 53 20 D2
```

```
0B39:49 4E 54 4C 20 4C 54 44 F5
0B41:0D 41 4C 4C 20 52 49 47 A0
0B49:48 54 53 20 52 45 53 45 98
0B51:52 56 45 44 43 44 20 42 C0
0B59:49 54 2D 4D 41 50 20 46 75
0B61:49 4C 45 3F 2C 50 2C 52 19
0B69:4E 63 65 66 51 59 5A 5B 92
0B71:44 4F 20 41 4E 4F 54 48 36
0B79:45 52 20 44 4F 4F 44 4C 9B
0B81:45 3F 20 59 2F 4E 50 4C 43
0B89:41 43 45 20 44 4F 4F 44 FD
0B91:4C 45 20 44 49 53 4B 20 B5
0B99:49 4E 20 44 52 49 56 45 D9
0BA1:20 48 49 54 20 41 4E 59 44
0BA9:20 4B 45 59 00 00 00 00 E0
```

Daniel Lightner, the author of Risers and Sliders, lives in Sidney, Montana.

SILICON COBBLER

By Bob Markland

Convenience! Webster defines *convenience* as "anything that saves work." Busy people of the nineties demand convenience. Recognizing this, many commercial programs load and run with the fewest possible keystrokes from the user. Unfortunately, this convenience isn't available on many disks and most shorter programs.

Silicon Cobbler is an autoboot maker that provides a simple solution to this and requires no computer or programming experience. Although there have been a number of autoboot makers written, many attach themselves to a program and permanently alter it. Some work only with BASIC programs; others work only with machine language routines.

Silicon Cobbler works with virtually any program and allows maximum flexibility. Most important, it creates a one-block autoboot program that is totally independent of the original program.

With an autoboot as the first file on the disk followed by a menu/loader, you have a combination that creates effortless program selection and loading.

Typing It In

Silicon Cobbler is written entirely in BASIC. To help avoid errors, enter it with The Automatic Proofreader, which you will find elsewhere in this section. Before exiting Proofreader, be sure to save a copy of the program to disk.

Creating an Autoboot

To use Silicon Cobbler, load and run it as you would any BASIC program. It takes only a few minutes to create an autoboot. Silicon Cobbler walks you through, letting you select the border, screen, and character colors during the initial loading. These attributes enable you to select the visual effects you want for a smooth transition while your main program loads.

You are then prompted for the name of the program to be loaded and run. Enter the filename of the program for which you are creating the autoboot. You may type the first few letters followed by an asterisk (*) wildcard, as long as no filename conflicts result.

You are then asked for the command to activate the program. Type in the command that you normally use to activate the main program. This is usually RUN or SYS and a starting address. The next prompt asks for a character color following the load. In most cases, set this attribute to match the screen and border color in steps 1 and 2. This provides for a smooth transition. You are then asked for a filename for the autoboot program. For easy identification, give the autoboot a name similar to the name of the program it boots. For example, you might add the suffix LOAD or BOOT to the filename. Silicon Cobbler then lists the choices that you have made. Carefully check each attribute. If you find an error, press S to start over; otherwise, press C to Continue.

When you continue, the autoboot will be created. Be sure the destination disk is in the drive. There are two techniques for utilizing autoboots. If the autoboot is the first directory entry, the program may be booted by typing *LOAD"*",8,1*. For programs elsewhere in the directory, load the autoboot program with the ,8,1 extension.

The final prompt gives you the option to make additional autoboots or quit to BASIC.

Troubleshooting

If a BASIC program will not autoboot, check the program's load address. If it's not 2049, change it.

Silicon Cobbler checks for disk drive errors. If a filename already exists on your disk, select another name, or overwrite the existing autoboot. If you find that an autoboot does not work properly, create a new autoboot and overwrite the old one.

Advanced Techniques

Autoboots can be successfully added to nearly all disks, including backups of commercial software. If the program uses a standard directory, save the autoboot as you normally would, and then move its filename to the first directory position.

In cases where there is only one file listed and no bytes free, there may still be a solution. With a sector editor, carefully check track 18's directory sectors. They may be standard even if the other tracks and sectors are not. If this is the case, create an autoboot on another disk and copy it to an unused sector on track 18. Use your sector editor to move the existing filenames in order to open the first position.

Finally, write the first directory entry for the autoboot and set its pointers to the sector on track 18 containing the autoboot. What with the possibility of a crash, never attempt this on the original commercial disk!

SILICON COBBLER

```
JS 10 REM: COPYRIGHT 1993 - CO
      MPUTE PUBLICATIONS INTL
      {SPACE}LTD - ALL RIGHTS
      {SPACE}RESERVED
FF 20 :
JP 50 PRINT"{CLR}"CHR$(142)CHR
      $(8):POKE53280,2:POKE532
      81,7:DIMC$(15):POKE788,5
      2
CM 60 FORR=0TO15:READJU$:NEXT:
      FORR=1TO125:READDT:CK=CK
      +DT:NEXT
HB 70 IFCK<>15188THENPRINT"
      {HOME}{BLK}{10 DOWN}
      {8 SPACES}ERROR IN NUMER
      ICAL DATA":STOP
HB 80 ML$="":RESTORE:FORR=0TO1
      5:READC$(R):NEXT
GE 90 BL$="":FORR=1TO39:BL$=BL
      $+" ":NEXT
SP 100 PRINT"{CLR}{BLK}"TAB(12
      )"{DOWN}SILICON COBBLER
      ":PRINTTAB(11)"PROGRAM
      {SPACE}BOOT MAKER"
SB 110 PRINTTAB(12)"{DOWN}BY R
      . MARKLAND"
PX 120 PRINTTAB(16)"(C) 1993":
      PRINTTAB(5)"COMPUTE PUB
      LICATIONS INTL LTD"
FA 130 FORR=1TO24:READDT:ML$=M
      L$+CHR$(DT):NEXT
BD 140 GOSUB830:PRINT"
      {4 SPACES}SELECT BORDER
       COLOR DURING LOAD":PRI
```

```
      NTTAB(16)"(0-15){DOWN}"
PK 150 TB=18:NT=0:LE=2:GOSUB85
      0:BC=VAL(TP$):IFBC>15TH
      EN140
EX 160 ML$=ML$+CHR$(BC):GOSUB8
      20
HQ 170 FORR=1TO4:READDT:ML$=ML
      $+CHR$(DT):NEXT
CE 180 GOSUB830:PRINT"
      {4 SPACES}SELECT SCREEN
       COLOR DURING LOAD":PRI
      NTTAB(16)"(0-15){DOWN}"
FP 190 TB=18:NT=0:LE=2:GOSUB85
      0:SC=VAL(TP$):IFSC>15TH
      EN180
HP 200 ML$=ML$+CHR$(SC):GOSUB8
      20
JS 210 FORR=1TO4:READDT:ML$=ML
      $+CHR$(DT):NEXT
KJ 220 GOSUB830:PRINT"
      {3 SPACES}SELECT CHARAC
      TER COLOR DURING LOAD":
      PRINTTAB(16)"(0-15)
      {DOWN}"
XK 230 TB=18:NT=0:LE=2:GOSUB85
      0:CL=VAL(TP$):IFCL>15TH
      EN220
FX 240 ML$=ML$+CHR$(CL):GOSUB8
      20
GP 250 FORR=1TO33:READDT:ML$=M
      L$+CHR$(DT):NEXT
CD 260 GOSUB830:PRINTTAB(9)"EN
      TER NAME OF PROGRAM"
      {17 SPACES}
BF 270 PRINTTAB(11)"TO BE LOAD
      ED/RUN:":PRINTTAB(11)"(
      1-16 CHARACTERS){DOWN}"
HE 280 TB=12:NT=1:LE=16:GOSUB8
      50:NA$=TP$:ML$=ML$+CHR$
      (LEN(NA$)):GOSUB820
QK 290 FORR=1TO31:READDT:ML$=M
      L$+CHR$(DT):NEXT
FE 300 GOSUB830:PRINTTAB(8)"EN
      TER NECESSARY COMMAND"
MF 310 PRINTTAB(10)"TO ACTIVAT
      E PROGRAM":PRINTTAB(11)
      "YOU WISH TO BOOT:"
BK 320 PRINTTAB(8)"(E.G. RUN O
      R SYS49152){DOWN}"
EP 330 TB=12:NT=1:LE=8:GOSUB85
      0:CM$=TP$:ML$=ML$+CHR$(
      LEN(CM$)):GOSUB820
AK 340 FORR=1TO10:READDT:ML$=M
      L$+CHR$(DT):NEXT
PH 350 ML$=ML$+CHR$(LEN(CM$)+1
      ):FORR=1TO11:READDT:ML$
      =ML$+CHR$(DT):NEXT
JR 360 GOSUB830:PRINT" SELECT
      {SPACE}CHARACTER COLOR
      {SPACE}FOLLOWING LOAD"
DR 370 PRINTTAB(16)"(0-15)
      {DOWN}"
PQ 380 TB=18:NT=0:LE=2:GOSUB85
      0:CP=VAL(TP$):IFCP>15TH
      EN360
MH 390 GOSUB820:ML$=ML$+CHR$(C
      P):FORR=1TO8:READDT:ML$
      =ML$+CHR$(DT):NEXT
ES 400 ML$=ML$+"LOADING, PLEAS
      E WAIT...."+CHR$(0)
CX 410 FORR=1TOLEN(NA$):ML$=ML
      $+MID$(NA$,R,1):NEXT:IF
      LEN(NA$)=16THEN430
XC 420 FORR=LEN(NA$)+1TO16:ML$
      =ML$+CHR$(234):NEXT
PB 430 FORR=1TOLEN(CM$):ML$=ML
      $+MID$(CM$,R,1):NEXT:ML
      $=ML$+CHR$(13)
XA 440 GOSUB830:PRINTTAB(11)"E
      NTER A FILE NAME"
KS 450 PRINTTAB(11)"FOR THIS A
      UTOBOOT:":PRINTTAB(11)"
      (1-16 CHARACTERS){DOWN}
      "
HD 460 TB=12:NT=1:LE=16:GOSUB8
      50:LN$=TP$:GOSUB820
PC 470 GOSUB830:PRINTTAB(2)"BO
      RDER COLOR IS:"TAB(38-L
      EN(C$(BC)))C$(BC)
HP 480 PRINTTAB(2)"SCREEN COLO
      R IS:"TAB(38-LEN(C$(SC)
      ))C$(SC)
GX 490 PRINTTAB(2)"LOAD CHR CO
      LOR IS:"TAB(38-LEN(C$(C
      L)))C$(CL)
FX 500 PRINTTAB(2)"PROGRAM TO
      {SPACE}BOOT IS:"TAB(38-
      LEN(NA$))NA$
GE 510 PRINTTAB(2)"CMD TO ACTI
      VATE IS:"TAB(38-LEN(CM$
      ))CM$
QF 520 PRINTTAB(2)"PROG CHR CO
      LOR IS:"TAB(38-LEN(C$(C
      P)))C$(CP)
ES 530 PRINTTAB(2)"AUTOBOOT NA
      ME IS:"TAB(38-LEN(LN$))
      LN$
PP 540 PRINTTAB(7)"{2 DOWN}PLE
      ASE REVIEW YOUR CHOICES
      ":PRINTTAB(15)"{DOWN}TH
      EN PRESS"
CH 550 PRINT"{DOWN} (C) TO CON
      TINUE -/- (S) TO START
      {SPACE}OVER"
CB 560 GETD$:IFD$=""THEN560
HR 570 IFD$="S"THEN80
EE 580 IFD$<>"C"THEN560
EQ 590 GOSUB830:PRINTTAB(8)"IN
      SERT DESTINATION DISK":
      PRINTTAB(15)"{DOWN}THEN
       PRESS"
JQ 600 PRINTTAB(7)"{DOWN}ANY K
      EY TO CREATE AUTOBOOT":
      POKE198,0
CG 610 GETD$:IFD$=""THEN610
AF 620 GOSUB830:PRINTTAB(8)"
      {4 DOWN}WORKING, PLEASE
       WAIT...."
DS 630 OPEN15,8,15,"I0:":OPEN8
      ,8,8,"0:"+LN$+",P,R":CL
      OSE8:FL=0:GOSUB960
PS 640 IFFLTHEN470
CE 650 OPEN15,8,15:OPEN8,8,8,"
      0:"+LN$+",P,W":CLOSE8:F
      L=0:GOSUB960
CB 660 IFFLTHEN470
DX 670 IFE1<>63THEN740
DK 680 GOSUB830:MS$="FILE "+CH
      R$(34)+LN$+CHR$(34)+" A
      LREADY EXISTS"
RC 690 PRINTTAB((40-(LEN(MS$))
      )/2)MS$
GJ 700 PRINTTAB(13)"{DOWN}OVER
      WRITE IT?":PRINTTAB(16)
      "Y -/- N"
JR 710 GETD$:IFD$=""THEN710
PK 720 IFD$="N"THEN440
RK 730 IFD$<>"Y"THEN710
RE 740 OPEN15,8,15,"I0:":PRINT
      #15,"S0:"+LN$:CLOSE15
SJ 750 OPEN8,8,8,"O:"+LN$+",P,
      W":PRINT#8,ML$:CLOSE8:C
      LOSE15
PX 760 GOSUB830:PRINT"{2 DOWN}
      {2 SPACES}AUTOBOOT COMP
      LETED, DO YOU WISH TO:"
DF 770 PRINTTAB(10)"{DOWN}1.
      {2 SPACES}CREATE ANOTHE
      R?":PRINTTAB(10)"{DOWN}
      2.{2 SPACES}QUIT?"
PQ 780 GETD$:IFD$=""THEN780
KF 790 IFD$="1"THEN80
MS 800 IFD$<>"2"THEN780
XD 810 PRINT"{CLR}":POKE646,14
      :POKE647,14:POKE53280,1
      4:POKE53281,6:POKE788,4
      9:END
BE 820 PRINT:PRINTTAB(16)"
      {DOWN}ENTERED":FORT=1TO
      1000:NEXT
MF 830 PRINT"{HOME}{9 DOWN}":F
      ORR=1TO14:PRINTBL$:NEXT
      :PRINT"{HOME}{9 DOWN}"
CM 840 RETURN
GM 850 POKE198,0:PRINTTAB(TB);
      :POKE204,0:TP$=""
GS 860 POKE647,PEEK(646):GETKI
      $:IFKI$=""THEN860
KM 870 IFKI$=CHR$(34)THEN860
JF 880 IFKI$=CHR$(13)ANDLEN(TP
      $)>0THENPRINT" ";:POKE2
      04,1:RETURN
FR 890 IFKI$<CHR$(20)ANDLEN(TP
      $)>0THENTP$=LEFT$(TP$,L
      EN(TP$)-1):GOTO950
KR 900 IFKI$=>CHR$(48)ANDKI$=<
      CHR$(57)THEN930
DB 910 IFNTTHENIFKI$=>CHR$(32)
      ANDKI$=<CHR$(90)THEN930
CA 920 GOTO860
PG 930 IFLEN(TP$)=(LE)THEN860
SD 940 TP$=TP$+KI$
HK 950 PRINTKI$;:GOTO860
GQ 960 INPUT#15,E1,ER$,E2,E3
GF 970 IFE1=0ORE1=62ORE1=63THE
      NCLOSE15:RETURN
XF 980 CLOSE15:FL=1
HC 990 GOSUB830:PRINTTAB(9)"*
      {SPACE}* * DISK ERROR *
       * *"
KK 1000 PRINTTAB(10)"{DOWN}";E
```

```
         1;ER$;E2;E3
BR 1010  PRINTTAB(3)"{DOWN}CHEC
         K DISK & DRIVE, THEN T
         RY AGAIN"
MB 1020  PRINTTAB(7)"{DOWN}PRES
         S ANY KEY TO CONTINUE"
EX 1030  GETD$:IFD$=""THEN1030
DA 1040  RETURN
PH 1050  DATA BLACK,WHITE,RED,C
         YAN,PURPLE,GREEN,BLUE,
         YELLOW,ORANGE,BROWN,LI
         GHT RED
KH 1060  DATA DARK GRAY,MEDIUM
         {SPACE}GRAY,LIGHT GREE
         N,LIGHT BLUE,LIGHT GRA
         Y
RF 1070  DATA 44,3,60,3,102,254
         ,165,244,237,245,0,0,0
         ,0,0,0,0,0
RF 1080  DATA 169,147,32,210,25
         5,169
QR 1090  DATA 141,32,208,169
RR 1100  DATA 141,33,208,169
BX 1110  DATA 141,134,2,32,138,
         255,32,231,255,160,0,2
         4,162,12,160,8,32,240,
         255
GQ 1120  DATA 160,0,185,174,3,2
         40,6,32,210,255,200,20
         8,245,169
KB 1130  DATA 162,199,160,3,32,
         189,255,169,1,168,162,
         8,32,186,255,173,33,20
         8
PE 1140  DATA 141,134,2,169,0,3
         2,213,255,134,45,132,4
         6,160
MR 1150  DATA 185,215,3,153,119
         ,2,136,16,247,169
HP 1160  DATA 133,198,32,94,166
         ,169,147,32,210,255,16
         9
AJ 1170  DATA 141,134,2,162,128
         ,108,2,3
```

Bob Markland is the author of Electronic Billboard, a bonus program on the March Gazette Disk. He lives in Newcastle, Wyoming.

TELEWORD 128

Donald G. Klich

Have you ever watched a television commercial and been asked to call a telephone number that's in the form of a catchy phrase for the advertiser's product? A financial lender might want you to dial CASH NOW for a quick loan, or perhaps an automobile dealer might tell you to call 1-800 CAR DEAL for a great deal in a used car.

Except for numbers 1 and 0, each number on a standard U.S. telephone contains a group of three letters. All the letters of the alphabet except *Q* and *Z* are represented. So, to dial CASH NOW, you'd press the numbers that correspond to those letters on the dial. In this example, those numbers would be 2274669.

Have you ever wondered if the letters associated with your telephone number might spell something clever? Rather than trying to go through all of the combinations mentally, Teleword 128 is the program you need.

Entering the Program

Teleword 128 is written entirely in BASIC 7.0 for the 128. To help avoid typing errors, enter it with The Automatic Proofreader, which can be found elsewhere in this section. Be sure to save a copy of the program before you try to run it.

Number, Please

All you have to do is run Teleword 128 and enter a seven-digit number. The program will print out or display on-screen every combination of letters possible for that number. In case you are wondering, the maximum number of possibilities is 2178. (That's 3 to the seventh power.) That many combinations will fill four printed pages or 20 screens.

If you have any 0s or 1s in your telephone number, you'll end up with fewer combinations since there are no corresponding letters for these numbers.

You may be surprised at how few good word combinations turn up. I'm convinced that the stores first devise a clever word/number and then attempt to get that number from the telephone company. That's particularly easy to do with 800 numbers.

Just in case you're wondering, if you have telephone number 266-7883, that's the one that spells *COMPUTE*. Of course, it also spells *BOOSTUF*, whatever that means!

TELEWORD 128

```
MS 10  REM COPYRIGHT 1993 - COM
       PUTE PUBLICATIONS INTL L
       TD - ALL RIGHTS RESERVED
XD 20  DIMA$(10,3):FORI=0TO9:FO
       RJ=1TO3:READB$:A$(I,J)=B
       $:NEXTJ,I:COLOR0,1:COLOR
       1,11:COLOR4,1:GRAPHIC2,1
       ,7:L=2:R=0:LS=2:RS=0
SR 30  CHAR1,7,4,"TELEPHONE NUM
       BER CONVERTER":COLOR1,2:
       CIRCLE1,160,35,120,15
HD 40  INPUT"{WHT}OUTPUT TO THE
        {RED}P{WHT}RINTER OR
       {RED}T{WHT}UBE P/T";Q$:I
       FQ$="T"THENSW=0:GOTO70
FA 50  IFQ$="P"THENSW=1:OPEN1,4
       :ELSERUN
JE 60  PRINT"{3 DOWN}{CYN}BE SU
       RE THAT YOUR PRINTER IS
       {SPACE}SET TO THE":PRINT
       SPC(10)"TOP OF A PAGE...
       {6}"
DP 70  PRINT"{3 DOWN}{2 SPACES}
       WHAT IS THE TELEPHONE NU
       MBER{2 SPACES}NNNNNNN";:
       SLEEP1:INPUT"{9 LEFT}";B
       $:IFLEN(B$)>7ORLEN(B$)<7
       THENPRINT"{4 DOWN}SEVEN
       {SPACE}DIGITS PLEASE":SL
       EEP1:RUN
XM 80  FORI=1TO7:C$=MID$(B$,I,1
       ):IFVAL(C$)<2THENN(I)=1:
       ELSEN(I)=3
JM 90  NEXTI
XF 100 IFSWTHENGOSUB160:GOTO11
       0:ELSEGOSUB200
SD 110 FORA=1TON(1):FORB=1TON(
       2):FORC=1TON(3):FORD=1T
       ON(4):FORE=1TON(5):FORF
       =1TON(6):FORG=1TON(7):T
       $=A$(VAL(MID$(B$,1,1)),
       A)+A$(VAL(MID$(B$,2,1))
       ,B)
HC 120 T$=T$+A$(VAL(MID$(B$,3,
       1)),C)+A$(VAL(MID$(B$,4
       ,1)),D)+A$(VAL(MID$(B$,
       5,1)),E)+A$(VAL(MID$(B$
       ,6,1)),F)+A$(VAL(MID$(B
       $,7,1)),G)
DS 130 IFSWTHENGOSUB170:GOTO14
       0:ELSEGOSUB210
EP 140 NEXTG,F,E,D,C,B,A:IFSWG
       OTO190:ELSE250
HE 150 DATA0,0,0,1,1,1,A,B,C,D
       ,E,F,G,H,I,J,K,L,M,N,O,
       P,R,S,T,U,V,W,X,Y
BK 160 PRINT#1,"PRINTOUT FOR T
       ELEPHONE NUMBER ";LEFT$
       (B$,3);"-";RIGHT$(B$,4)
       :PRINT#1:RETURN
HM 170 PRINT#1,T$;" ";:T=T+1:R
       =R+1:IFR=10THENR=0:PRIN
       T#1:L=L+1
JH 180 IFL=60THENFORL=1TO6:PRI
       NT#1:NEXTL:L=0:RETURN:E
       LSERETURN
DJ 190 PRINT#1:PRINT#1,"THERE
       {SPACE}WERE "T" COMBINA
       TIONS":CLOSE1:END
XR 200 GRAPHIC0,1:PRINT"DISPLA
       Y OF TELEPHONE NUMBER "
       ;LEFT$(B$,3);"-";RIGHT$
       (B$,4):PRINT:RETURN
QG 210 PRINTT$;" ";:T=T+1:RS=R
       S+1:IFRS=5THENRS=0:PRIN
       T:LS=LS+1
```

```
KE 220 IFLS<>23THENRETURN:ELSE
       LS=2:PRINT"PRESS SPACE
       {SPACE}TO CONTINUE"
FD 230 GETKEYQ$:IFQ$<>" "THEN2
       30
MM 240 GOSUB200:RETURN
QB 250 PRINT:PRINT"THERE WERE
       {SPACE}"T" COMBINATIONS
       ":END
```

Donald Klich lives in Mount Prospect, Illinois. He didn't say anything about his own telephone number. ❐

ONLY ON DISK

In addition to the type-in programs found in each issue of the magazine, Gazette Disk offers bonus programs. Here's a special program that you'll find only on this month's disk.

Football
By Jack Rollan
New York, NY

Summer is drawing to a close, leaves are beginning to change color, and back-to-school sales are popping up at the mall. These signs can mean just one thing: FOOTBALL!

Jack Rollan's Football is a real-time, solitaire football simulation that allows users to design their own plays and then attempt to execute them on the field. You'll control the players in the yellow and white uniforms (the home team) with your joystick in port 2.

Load Football with the ,8,1 extension, and then type *SYS 49152* to start. This is a large game, and it takes several minutes to load. If you have an accelerator cartridge, it'll come in handy here.

With your joystick, you design plays to run, pass, punt, or attempt field goals. After the center hikes the ball, the screen changes to graphics mode. At this point, you control the quarterback on offense or the free safety on defense.

You can have this program, our PD selections, and all the other programs in this issue by ordering the September Gazette Disk. The U.S. price is $9.95 plus $2.00 shipping and handling. Send your order to Gazette Disk, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

The Automatic Proofreader helps you type in program listings for the 128 and 64 and prevents nearly every kind of typing mistake.

Type in Proofreader exactly as listed. Because the program can't check itself, be sure to enter each line carefully to avoid typographical errors or other mistakes. Don't omit any lines, even if they contain unusual commands. After you've finished, save a copy of the program before running it.

Next, type *RUN* and press Return. After the program displays the message *Proofreader Active,* you're ready to type in a BASIC program.

Every time you finish typing a line and press Return, Proofreader displays a two-letter checksum in the upper left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, the line probably was typed correctly. If not, check for your mistake and correct the line. Also, be sure not to skip any lines.

Proofreader ignores spaces not enclosed in quotation marks, so you can omit or add spaces between keywords and still see a matching checksum. Spaces inside quotes are almost always significant, so the program pays attention to them.

Proofreader does not accept keyword abbreviations (for example, ? instead of PRINT). If you use abbreviations, you can still check the line by listing it, moving the cursor back to the line, and pressing Return.

If you're using Proofreader on the 128, do not perform any GRAPHIC commands while Proofreader is active. When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the Proofreader—to another memory area, causing Proofreader to crash. The same thing happens if you run any program with a GRAPHIC command while Proofreader is in memory.

Though Proofreader doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. To disable it, turn the computer off and then on. A gentler method is to SYS to the computer's built-in reset routine (65341 for the 128, 64738 for the 64).

AUTOMATIC PROOFREADER

```
0 CLR
10 VE=PEEK(772)+256*PEEK(773):
   LO=43:HI=44:PRINT"{CLR}
   {WHT}AUTOMATIC PROOFREADER
   {SPACE}FOR ";
20 IF VE=42364 THEN PRINT "64"
30 IF VE=17165 THEN LO=45:HI=4
   6:WAIT CLR:PRINT"128"
40 SA=(PEEK(LO)+256*PEEK(HI))+
   6:FOR J=SA TO SA+166:READ B
   :POKE J,B:CH=CH+B:NEXT
50 IF CH<>20570 THEN PRINT "*E
   RROR* CHECK TYPING IN DATA
   {SPACE}STATEMENTS":END
60 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
70 CH=CH+RF+LF+HF:POKE SA+LF,L
   B:POKE SA+HF,HB:NEXT
80 IF CH<>22054 THEN PRINT "*E
   RROR* RELOAD PROGRAM AND CH
   ECK FINAL LINE":END
90 IF VE=17165 THEN POKE SA+14
   ,22:POKE SA+18,23:POKESA+29
   ,224:POKESA+139,224
100 POKE SA+149,PEEK(772):POKE
    SA+150,PEEK(773):PRINT"
    {CLR}PROOFREADER ACTIVE"
110 SYS SA:POKE HI,PEEK(HI)+1:
    POKE (PEEK(LO)+256*PEEK(HI
    ))-1,0:NEW
120 DATA120,169,73,141,4,3,169
    ,3,141,5,3,88,96,165,20,13
    3,167
130 DATA165,21,133,168,169,0,1
    41,0,255,162,31,181,199,15
    7,227
140 DATA3,202,16,248,169,19,32
    ,210,255,169,18,32,210,255
    ,160
150 DATA0,132,180,132,176,136,
    230,180,200,185,0,2,240,46
    ,201
160 DATA34,208,8,72,165,176,73
    ,255,133,176,104,72,201,32
    ,208
170 DATA7,165,176,208,3,104,20
    8,226,104,166,180,24,165,1
    67
180 DATA121,0,2,133,167,165,16
    8,105,0,133,168,202,208,23
    9,240
190 DATA202,165,167,69,168,72,
    41,15,168,185,211,3,32,210
    ,255
200 DATA104,74,74,74,74,168,18
    5,211,3,32,210,255,162,31,
    189
210 DATA227,3,149,199,202,16,2
    48,169,146,32,210,255,76,8
    6,137
220 DATA65,66,67,68,69,70,71,7
    2,74,75,77,80,81,82,83,88
230 DATA 13,2,7,167,31,32,151,
    116,117,151,128,129,167,13
    6,137
```
❐

MLX

Machine Language Entry Program
MLX for Commodore 64

Ottis R. Cowper

Type in and save some copies of MLX—you'll want to use it to enter future ML programs from Gazette. When you're ready to enter an ML program, load and run MLX. It asks you for a starting address and an ending address. These addresses appear in the article accompanying the MLX-format program listing you're typing.

If you're unfamiliar with machine language, the addresses (and all other values you enter in MLX) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in *hexadecimal*—a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short—includes the numerals 0–9 and the letters *A–F*. But even if you know nothing about ML or hex, you should have no trouble using MLX.

After you've entered the starting and ending addresses, you'll be offered the option of clearing the workspace. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session, don't choose this option. A functions menu will appear. The first option in the menu is Enter Data. If you're just starting to type in a program, pick this. Press the E key and type the first number in the first line of the program listing. If you've already typed in part of a program, type the line number where you stopped typing at the end of the previous session (be sure to load the partially completed program before you resume entry). In any case, make sure the address you enter corresponds to the address of a line in the listing you are entering. Otherwise, you'll be unable to enter the data correctly. If you pressed E by mistake, you can return to the command menu by pressing Return alone when asked for the address. (You can get back to the menu from most options in the program by pressing Return with no other input.)

Entering a Listing

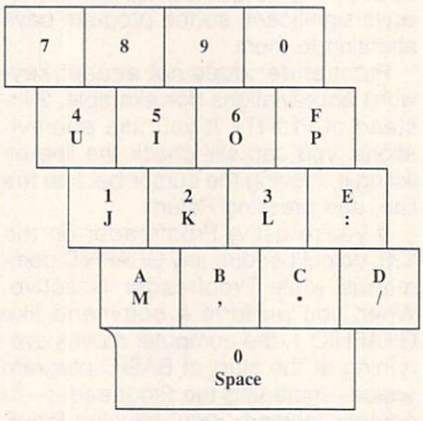
Once you're in Enter mode, MLX prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight data bytes and a checksum. Although an MLX-format listing appears similar to the "hex dump" listings from a machine language monitor program, the extra checksum number on the end allows MLX to check your typing.

When you enter a line, MLX recalculates the checksum from the eight bytes and the address and compares this value to the number from the ninth column. If the values match, you'll hear a bell tone, the data will be added to the workspace area, and the prompt for the next line of data will appear. But if MLX detects a typing error, you'll hear a low buzz and see an error message. The line will then be redisplayed for editing.

Invalid Characters Banned

Only a few keys are active while you're entering data, so you may have to unlearn some habits. You *do not* type spaces between the columns; MLX automatically inserts these for you. You *do not* press Return after typing the last number in a line; MLX automatically enters and checks the line after you type the last digit.

64 MLX Keypad



Only the numerals 0–9 and the letters *A–F* can be entered. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, a numeric keypad function is included. The keypad is active only while entering data. Addresses must be entered with the normal letter and number keys. The figure below shows the keypad configuration.

MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, MLX will catch your mistake. There is one error that can slip past MLX: Because of the checksum formula used, MLX won't notice if you accidentally type FF in place of 00, and vice versa. And there's a very slim chance that you could garble a line and still end up with a combination of characters that adds up to the proper checksum. However, these mistakes should not occur if you take care while entering data.

Editing Features

To correct typing mistakes before finishing a line, use the Inst/Del key to delete the character to the left of the cursor. If you mess up a line badly, press Clr/Home to start the line over. The Return key is also active, but only before any data is typed on a line. Pressing Return at this point returns you to the command menu. After you type a character, MLX disables Return until the cursor returns to the start of a line. Remember, press Clr/Home to quickly get to a line-number prompt. To make corrections in a line that MLX has redisplayed for editing, compare the line on the screen with the one printed in the listing and then move the cursor to the mistake and type the correct key. The cursor- left and -right keys provide the normal cursor controls. (The Inst/Del key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. During editing, Return is active; pressing it tells MLX to recheck the line. You can press the Clr/Home key to clear the entire line if you want to start from scratch or if you want to get to a line-number prompt to use Return to get back to the menu.

Display Data

The second menu choice, Display Data, examines memory and shows the contents in the same format as the program listing (including the checksum). When you press D, MLX asks you for a starting address. Be sure that the starting address you give corresponds to a line number in the listing. Otherwise, the checksum display will be meaningless. MLX displays program lines until it reaches the end of the program, at

which point the menu is redisplayed. You can pause the display by pressing the space bar. (MLX finishes printing the current line before halting.) Press the space bar again to restart the display. To break out of the display and get back to the menu before the ending address is reached, press Return.

Other Menu Options

Two more menu selections let you save programs and load them back into the computer. These are Save File and Load File. When you press S or L, MLX asks you for the filename. You'll then be asked to press either D or T to select disk or tape.

You'll notice the disk drive starting and stopping several times during a load or save. This is normal behavior. MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands. Also note that the drive prefix 0: is added to the filename (line 750), so this should *not* be included when entering the name. This also precludes the use of @ for save-with-replace, so be sure to give each version saved a different name.

Remember that MLX saves the entire workspace area from the starting address to the ending address, so the save or load may take longer than you might expect if you've entered only a small amount of data from a long listing. When you're saving a partially completed listing, make sure to note the address where you stopped typing.

MLX reports the standard disk or tape error messages if any problems are detected during the save or load. It also has three special load error messages: INCORRECT STARTING ADDRESS, which means the file you're trying to load does not have the starting address you specified when you ran MLX; LOAD ENDED AT *address*, which means the file you're trying to load ends before the ending address you specified when you started MLX; and TRUNCATED AT ENDING ADDRESS, which means the file you're trying to load extends beyond the ending address you specified when you started MLX. If you see one of these messages and feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct starting and ending addresses.

The Quit menu option has the obvious effect—it stops MLX and enters BASIC. The Run/Stop key is disabled, so the Q option lets you exit the program without turning off the computer. (Of course, Run/Stop–Restore also gets you out.) You'll be asked for verification; press Y to exit to BASIC, or press any other key to return to the menu. After quitting, you can type RUN again and reenter MLX without losing your data, as long as you don't use the Clear Workspace option.

The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready for the results. Refer to the corresponding article for details on loading and running the program.

An Ounce of Prevention

Don't take chances—use The Automatic Proofreader to type the new MLX, and then test your copy *thoroughly* before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses; then use the display option to verify that the data has been entered correctly. Test the save and load options to ensure that you can recall your work from disk.

64 MLX

```
SS 10 REM VERSION 1.1: LINES 8
      30,950 MODIFIED, LINES 4
      85-487 ADDED
EK 100 POKE 56,50:CLR:DIM IN$,
      I,J,A,B,A$,B$,A(7),N$
DM 110 C4=48:C6=16:C7=7:Z2=2:Z
      4=254:Z5=255:Z6=256:Z7=
      127
CJ 120 FA=PEEK(45)+Z6*PEEK(46)
      :BS=PEEK(55)+Z6*PEEK(56
      ):H$="0123456789ABCDEF"
SB 130 R$=CHR$(13):L$="{LEFT}"
      :S$=" ":D$=CHR$(20):Z$=
      CHR$(0):T$="{13 RIGHT}"
CQ 140 SD=54272:FOR I=SD TO SD
      +23:POKE I,0:NEXT:POKE
      {SPACE}SD+24,15:POKE 78
      8,52
FC 150 PRINT"{CLR}"CHR$(142)CH
      R$(8):POKE 53280,15:POK
      E 53281,15
EJ 160 PRINT T$" {RED}{RVS}
      {2 SPACES}{8 @}
      {2 SPACES}"SPC(28)"
      {2 SPACES}{OFF}{BLU} ML
      X II {RED}{RVS}
      {2 SPACES}"SPC(28)"
      {12 SPACES}{BLU}"
FR 170 PRINT"{3 DOWN}
      {3 SPACES}COMPUTE!'S MA
      CHINE LANGUAGE EDITOR
      {3 DOWN}"
JB 180 PRINT"{BLK}STARTING ADD
      RESS{4}";:GOSUB300:SA=A
      D:GOSUB1040:IF F THEN18
      0
GF 190 PRINT"{BLK}{2 SPACES}EN
      DING ADDRESS{4}";:GOSUB
      300:EA=AD:GOSUB1030:IF
      {SPACE}F THEN190
KR 200 INPUT"{3 DOWN}{BLK}CLEA
      R WORKSPACE [Y/N]{4}";A
      $:IF LEFT$(A$,1)<>"Y"TH
      EN220
PG 210 PRINT"{2 DOWN}{BLU}WORK
      ING...";:FORI=BS TO BS+
      EA-SA+7:POKE I,0:NEXT:P
      RINT"DONE"
DR 220 PRINTTAB(10)"{2 DOWN}
      {BLK}{RVS} MLX COMMAND
      {SPACE}MENU {DOWN}{4}":
      PRINT T$"{RVS}E{OFF}NTE
      R DATA"
BD 230 PRINT T$"{RVS}D{OFF}ISP
      LAY DATA":PRINT T$"
      {RVS}L{OFF}OAD FILE"
JS 240 PRINT T$"{RVS}S{OFF}AVE
       FILE":PRINT T$"{RVS}Q
      {OFF}UIT{2 DOWN}{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=
      MID$("EDLSQ",I,1)THEN A
      =I:I=5
FD 270 NEXT:ON A GOTO420,610,6
      90,700,280:GOSUB1060:GO
      TO250
EJ 280 PRINT"{RVS} QUIT ":INPU
      T"{DOWN}{4}ARE YOU SURE
       [Y/N]";A$:IF LEFT$(A$,
      1)<>"Y"THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IF
      LEN(IN$)<>4THENRETURN
KF 310 B$=IN$:GOSUB320:AD=A:B$
      =MID$(IN$,3):GOSUB320:A
      D=AD*256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID
      $(B$,J,1):B=ASC(A$)-C4+
      (A$>"@")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=
      0:A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(
      H$,B+1,1);:B=A-B*C6:PRI
      NT MID$(H$,B+1,1);:RETU
      RN
RR 360 A=INT(AD/Z6):GOSUB350:A
      =AD-A*Z6:GOSUB350:PRINT
      ":";
BE 370 CK=INT(AD/Z6):CK=AD-Z4*
      CK+Z5*(CK>Z7):GOTO390
```

```
PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT"{DOWN}STARTING AT
       {4}";:GOSUB300:IF IN$<>
       N$ THEN GOSUB1030:IF F
       {SPACE}THEN400
EX 410 RETURN
HD 420 PRINT"{RVS} ENTER DATA
       {SPACE}":GOSUB400:IF IN
       $=N$ THEN220
JK 430 OPEN3,3:PRINT
SK 440 POKE198,0:GOSUB360:IF F
        THEN PRINT IN$:PRINT"
       {UP}{5 RIGHT}";
GC 450 FOR I=0 TO 24 STEP 3:B$
       =S$:FOR J=1 TO 2:IF F T
       HEN B$=MID$(IN$,I+J,1)
HA 460 PRINT"{RVS}"B$L$;:IF I<
       24THEN PRINT"{OFF}";
HD 470 GET A$:IF A$=N$ THEN470
FK 480 IF(A$>"/"ANDA$<":")OR(A
       $>"@"ANDA$<"G")THEN540
GS 485 A=-(A$="M")-2*(A$=",")-
       3*(A$=".")-4*(A$="/")-5
       *(A$="J")-6*(A$="K")
FX 486 A=A-7*(A$="L")-8*(A$=":
       ")-9*(A$="U")-10*(A$="I
       ")-11*(A$="O")-12*(A$="
       P")
CM 487 A=A-13*(A$=S$):IF A THE
       N A$=MID$("ABCD123E456F
       0",A,1):GOTO 540
MP 490 IF A$=R$ AND((I=0)AND(J
       =1)OR F)THEN PRINT B$;:
       J=2:NEXT:I=24:GOTO550
KC 500 IF A$="{HOME}" THEN PRI
       NT B$:J=2:NEXT:I=24:NEX
       T:F=0:GOTO440
MX 510 IF(A$="{RIGHT}")ANDF TH
       ENPRINT B$L$;:GOTO540
GK 520 IF A$<>L$ AND A$<>D$ OR
       ((I=0)AND(J=1))THEN GOS
       UB1060:GOTO470
HG 530 A$=L$+S$+L$:PRINT B$L$;
       :J=2-J:IF J THEN PRINT
       {SPACE}L$;:I=I-3
QS 540 PRINT A$;:NEXT J:PRINT
       {SPACE}S$;
PM 550 NEXT I:PRINT:PRINT"{UP}
       {5 RIGHT}";:INPUT#3,IN$
       :IF IN$=N$ THEN CLOSE3:
       GOTO220
QC 560 FOR I=1 TO 25 STEP3:B$=
       MID$(IN$,I):GOSUB320:IF
        I<25 THEN GOSUB380:A(I
       /3)=A
PK 570 NEXT:IF A<>CK THEN GOSU
       B1060:PRINT"{BLK}{RVS}
       {SPACE}ERROR: REENTER L
       INE {4}":F=1:GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FO
       R I=0 TO 7:POKE B+I,A(I
       ):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN C
       LOSE3:PRINT"{DOWN}{BLU}
       ** END OF ENTRY **{BLK}
       {2 DOWN}":GOTO700
GQ 600 F=0:GOTO440
QA 610 PRINT"{CLR}{DOWN}{RVS}
       {SPACE}DISPLAY DATA ":G
       OSUB400:IF IN$=N$ THEN2
       20
RJ 620 PRINT"{DOWN}{BLU}PRESS:
        {RVS}SPACE{OFF} TO PAU
       SE, {RVS}RETURN{OFF} TO
        BREAK{4}{DOWN}"
KS 630 GOSUB360:B=BS+AD-SA:FOR
       I=BTO B+7:A=PEEK(I):GOS
       UB350:GOSUB380:PRINT S$
       ;
CC 640 NEXT:PRINT"{RVS}";:A=CK
       :GOSUB350:PRINT
KH 650 F=1:AD=AD+8:IF AD>EA TH
       ENPRINT"{DOWN}{BLU}** E
       ND OF DATA **":GOTO220
KC 660 GET A$:IF A$=R$ THEN GO
       SUB1080:GOTO220
EQ 670 IF A$=S$ THEN F=F+1:GOS
       UB1080
AD 680 ONFGOTO630,660,630
CM 690 PRINT"{DOWN}{RVS} LOAD
       {SPACE}DATA ":OP=1:GOTO
       710
PC 700 PRINT"{DOWN}{RVS} SAVE
       {SPACE}FILE ":OP=0
RX 710 IN$=N$:INPUT"{DOWN}FILE
       NAME{4}";IN$:IF IN$=N$
       {SPACE}THEN220
PR 720 F=0:PRINT"{DOWN}{BLK}
       {RVS}T{OFF}APE OR {RVS}
       D{OFF}ISK: {4}";
FP 730 GET A$:IF A$="T"THEN PR
       INT"T{DOWN}":GOTO880
HQ 740 IF A$<>"D"THEN730
HH 750 PRINT"D{DOWN}":OPEN15,8
       ,15,"I0:":B=EA-SA:IN$="
       0:"+IN$:IF OP THEN810
SQ 760 OPEN 1,8,8,IN$+",P,W":G
       OSUB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(A
       H*256):PRINT#1,CHR$(AL)
       ;CHR$(AH);
PE 780 FOR I=0 TO B:PRINT#1,CH
       R$(PEEK(BS+I));:IF ST T
       HEN800
FC 790 NEXT:CLOSE1:CLOSE15:GOT
       O940
GS 800 GOSUB1060:PRINT"{DOWN}
       {BLK}ERROR DURING SAVE:
       {4}":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+",P,R":G
       OSUB860:IF A THEN220
GE 820 GET#1,A$,B$:AD=ASC(A$+Z
       $)+256*ASC(B$+Z$):IF AD
       <>SA THEN F=1:GOTO850
RX 830 FOR I=0 TO B:GET#1,A$:P
       OKE BS+I,ASC(A$+Z$):IF(
       I<>B)AND ST THEN F=2:AD
       =I:I=B
FA 840 NEXT:IF ST<>64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F
       >0)+1 GOTO960,970
SA 860 INPUT#15,A,A$:IF A THEN
        CLOSE1:CLOSE15:GOSUB10
       60:PRINT"{RVS}ERROR: "A
       $
GQ 870 RETURN
EJ 880 POKE183,PEEK(FA+2):POKE
       187,PEEK(FA+3):POKE188,
       PEEK(FA+4):IFOP=0THEN92
       0
HJ 890 SYS 63466:IF(PEEK(783)A
       ND1)THEN GOSUB1060:PRIN
       T"{DOWN}{RVS} FILE NOT
       {SPACE}FOUND ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(8
       30):IF AD<>SA THEN F=1:
       GOTO970
SC 910 A=PEEK(831)+256*PEEK(83
       2)-1:F=F-2*(A<EA)-3*(A>
       EA):AD=A-AD:GOTO930
KM 920 A=SA:B=EA+1:GOSUB1010:P
       OKE780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOS
       UB1010:ON OP GOTO950:SY
       S 63591
AE 940 GOSUB1080:PRINT"{BLU}**
        SAVE COMPLETED **":GOT
       O220
XP 950 POKE147,0:SYS 63562:IF
       {SPACE}ST>0 THEN970
FR 960 GOSUB1080:PRINT"{BLU}**
        LOAD COMPLETED **":GOT
       O220
DP 970 GOSUB1060:PRINT"{BLK}
       {RVS}ERROR DURING LOAD:
       {DOWN}{4}":ON F GOSUB98
       0,990,1000:GOTO220
PP 980 PRINT"INCORRECT STARTIN
       G ADDRESS (";:GOSUB360:
       PRINT")":RETURN
GR 990 PRINT"LOAD ENDED AT ";:
       AD=SA+AD:GOSUB360:PRINT
        D$:RETURN
FD 1000 PRINT"TRUNCATED AT END
       ING ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH
       *256):POKE193,AL:POKE1
       94,AH
FF 1020 AH=INT(B/256):AL=B-(AH
       *256):POKE174,AL:POKE1
       75,AH:RETURN
FX 1030 IF AD<SA OR AD>EA THEN
       1050
CR 1040 IF (AD>511 AND AD<6528
       0) THEN GOSUB1080: F=0
       : RETURN
HC 1050 GOSUB1060:PRINT"{RVS}
       {SPACE}INVALID ADDRESS
        {DOWN}{BLK}":F=1:RETU
       RN
AR 1060 POKE SD+5,31:POKE SD+6
       ,208:POKE SD,240:POKE
       {SPACE}SD+1,4:POKE SD+
       4,33
DX 1070 FOR S=1 TO 100:NEXT:GO
       TO1090
PF 1080 POKE SD+5,8:POKE SD+6,
       240:POKE SD,0:POKE SD+
       1,90:POKE SD+4,17
AC 1090 FOR S=1 TO 100:NEXT:PO
       KE SD+4,0:POKE SD,0:PO
       KE SD+1,0:RETURN
```